

I. Laptev

THE WORLD OF MAN IN THE WORLD OF NATURE



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МИР ЛЮДЕЙ В МИРЕ ПРИРОДЫ

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Waves run ashore as they have done for hundreds and thousands of years but the sound of the sea cannot be heard. It is drowned by the hum of giant installations mounted on granite walls lining the coast. Huge pipes are sucking in the sea water. Scores of filters, magnetic fields and electric charges within the installations extract every milligram of metal and salt from the water. These milligrams add up to tons and thousands of tons. The now colourless and dead water is thrown back into the sea.

A man is walking slowly along the coast, along the narrow strip of rocks and sand separating the wall from the water. Time, the sun and intense thinking have drained his eyes of colour. With head bowed he watches a wave intently. He knows how treacherous the sea can be. The sea is his enemy and hates him. It is man who has fettered the shores in granite walls, mounted plants there and discovered the secret of "milking" sea water. Man has conquered the sea and walks there, weary of the struggle that has taken up his whole lifetime and afraid of slipping on the grey, slimy rocks. On he walks, leaving

behind him the steady hum of machinery and a dying sea....

The man walks along the coast. The strip of rocks and sand between the water and the walls has grown much wider. The dry rocks have turned a dull brown. Ugly fish are cast ashore, dolphins that barely resemble dolphins, monstrous crabs and octopuses. They do not start to fight each other. They no longer fight, they do not run to hiding, they do not hunt. Their life has ended here, on these ghastly brown rocks. The wind bears far away the smell of putrefaction.

But the man strides firmly ahead. He bends down and picks up dead fish. They disintegrate in his hands. He stares at the waste expanse of the sea.

"I must hurry or it will be too late," he says frowning.

He takes quicker steps. And as he proceeds the machinery falls silent. And the sea can be heard moaning....

Several centuries have passed over the Earth. And again the hum of machinery can be heard over the sea. The huge installations have come to life again, the pipes are again taking in water. But now the process is reversed. Dead fluid is being taken from the sea and returned to it as pure blue water. Blue patches are spreading further and further from the shore.

A man tanned by the sun walks cheerfully along the shore. He halts, then steps into the sea, scooping up the water in his palms. The sea trustingly reaches for his hands. He scrambles onto the rocks, which are again grey and clean. Looking at the throbbing plant, the young man exclaims:

"What a legacy from the past! The energy these giant machines consume in a day costs more than all the riches that were drawn from the sea in the course of centuries. And thousands of days like these are needed. But I'll

heal you! ” he cries, turning to the sea. “I’ll heal you and you shall live! ”

He laughs and, as he walks away, recites verses of long ago:

How curious! how real!

*Underfoot the divine soil, overhead the sun.**

For many years now the sea has been surging with full vigour.

Its waters have become blue-green and sea beasts have populated it. The man walks along the shores of a sparkling and kindly sea. The strip between the water and the wall has almost entirely disappeared. There are none of the ugly concrete boxes that once housed the machinery.

The water flows over his feet, the sea throws spray in his face. Turning to the sea, the man says:

“Wait a little while longer. Soon I shall demolish the barrier and free you. I shall free you, do you hear? ! ”

He starts on a businesslike way to measure the sea wall that has stood there for centuries.... And here we leave our science-fiction story in four instalments.... We are lagging behind him. We are in fact only approaching the second stage. The brown coastal rocks are only starting to emerge on the horizon. Mankind is still inclined to regard these rocks as a delusion and is still only on the point of bending down to the dying fish.

Was it not until quite recently that people were unreservedly proud of their conquests of nature? The belief that one had to master and transform the surrounding world was inseparable from the belief that this world of ours was inexhaustible and that it was man’s mission to dominate it. The Earth’s resources appeared boundless and the thousands of bonds linking the bio-

* Walt Whitman, *Leaves of Grass*, Modern Library, New York, p. 14.

logical species *Homo sapiens* with nature which bore him appeared insubstantial and were for all practical purposes ignored. This was only a few decades ago.

But now within the lifetime of a single generation, that of our contemporaries, a new and rather unusual concern has been added to the numerous concerns of mankind. One might say that for the first time in their social history people have been forced to reassess their role and place in the Earth's natural system. The results of this reassessment surprised and scared us. We find man at the present time to be no less, and perhaps even much more, dependent upon the weakness of nature than he was previously dependent upon its blind forces. We find the planet Earth small and not so rich that one need not reckon up and make sparing use of its resources. That the confines within which the human race leads its physical existence are not so extensive and any contraction is fraught with grave consequences. That the reckless and wasteful spoliation of natural resources is rapidly leading both the world of man and the world of nature to a catastrophe which may well arise from the growing shortage of energy, soil, water, food, metals and even air.

The problem of "society and nature" has rightly come to be recognised as one of the fundamental problems confronting world science. Scientists have embarked upon a thorough study of the origins and manifestations of the ecological crisis, and a search for ways and means of escaping it. Politicians have now to devise social and political measures to preserve and restore the environment, as well as new forms of redistributing natural resources in the world economy. Theoreticians have begun to comment on the results of scientific research and on the programmes drawn up by politicians.

Such commentaries are coloured by the outlook of

particular social groups or classes and they reflect a set of economic, social and cultural values and political, ideological and religious views. In this way ecological problems are closely linked with outlook problems and increasingly reveal their social, ideological and political essence. In turn the social, ideological and political essence of ecological problems is variously manifested and taken into account in different social and economic systems. The heritage of antagonistic formations in the utilisation of natural resources is intensified by the current practice of capitalism which is marked by new methods of despoiling the common inheritance of mankind—the riches of our planet. At the same time the experience of the new, socialist utilisation of nature is spreading increasingly. And mankind finds itself compelled to give ever more serious thought to considering what path it should follow in its further relations with nature.

The choice of this path is predetermined by history. "There are different ways of using nature. One can leave in one's wake barren, lifeless expanses that are inimical to man—the history of mankind knows many such examples. But ... it is possible and necessary to improve nature, to help it unfold its vital forces more fully.... This is our, socialist way."* At the present stage of civilisation it is the only possible way for the whole world of man in his relations with the world of nature.

* *Documents and Resolutions. XXVth Congress of the CPSU, Moscow, 1976, pp. 63-64.*

I. ON THE "SMALL PLANET" EARTH

O tireless fever-world that soars
And rushes breathless as it goes
To what unknown, disturbing goals?
This world in fee to golden laws
Has kind laws, which it does not know
As yet, but must one day unearth
And from the thick mist bring to birth.

Emile Verhaeren

"In our days everything seems pregnant with its contrary. Machinery, gifted with the wonderful power of shortening and fructifying human labour, we behold starving and overworking it. The new-fangled sources of wealth, by some strange weird spell, are turned into sources of want. The victories of art seem bought by the loss of character. At the same pace that mankind masters nature, man seems to become enslaved to other men or to his own infamy. Even the pure light of science seems unable to shine but on the dark background of ignorance. All our invention and progress seem to result in endowing material forces with intellectual life, and in stultifying human life into a material force."*

Marx said this in 1856. But a great deal of what we see in the world today over a century later give his words a surprisingly modern ring. In the light of ecological problems one cannot help noticing that man's achievements have often been won at great moral and material

* Karl Marx and Frederick Engels, *Selected Works*, in three volumes, Vol. One, Moscow, 1978, p. 500.

cost, while yesterday's successes are nullified by their negative consequences today.

The grandiose achievements of the genius of man, realised in the scientific and technological revolution, is making triumphant progress throughout the world, in the unprecedented upsurge of industrial production, in the growth of cities and of population and in the intensification of farming, which have illumined all corners of the human world. In this bright light mankind has for the first time seen a string of strange spectres—shortages of energy, raw materials, food, water, land and air, catastrophic mutations and a deluge of refuse. In its light mankind has for the first time seen “all the King's men” in action—that assault on nature of myriads of technical devices, of chemical and biological preparations, of the mighty colossus of science and so forth. Public opinion has thus become aware of the basic fact that the growing world of man, equipped with the most up-to-date science and technology, is exerting such great pressure on the world of nature that the latter's reactions are beginning noticeably to slow up the growth of social production and are having an effect upon man himself as a biological creature.

The chaotic and short-sighted exploitation of nature has produced a set of conflict situations in the utilisation of nature. Many of these situations undoubtedly have their roots deep in human history. Nevertheless it is only the unprecedented growth of productive forces and their operation in conditions of competition, the absence of planning and the insufficiency of our knowledge of nature which have acutely aggravated them and given them a global character.

In the first place (though nothing can be more relative than such an assignment of priority) comes the shortage of the basic resources mankind needs to support its normal life and activities. At the present time

we are utilising about 70 per cent of the soil suitable for farming by modern methods, about 50 per cent of the accretion of timber, about 10 per cent of the flow of the world's rivers and about 70 per cent of the natural growth of stocks of the basic varieties of commercial fish, that is to say, the utilisation of renewable resources is approaching its limit. It is important to note also that the degree of utilisation is extremely uneven: in some countries it approaches 100 per cent, while in others the rivers, forests and land still remain in their almost virgin state. The utilisation is also extremely uneconomical—every year millions of hectares of eroded land, huge tracts of utterly destroyed forest and entire basins of polluted rivers are lost to the economy. Mankind is feverishly counting up also the resources that cannot be renewed. The resulting figures also give no grounds for particular satisfaction. At the present time 100,000 million tons of ores of various kind are being extracted every year from the bowels of our planet. The figure may rise to 600,000 million tons by the end of this century at the present rate and with the present methods of mining and using ores.

Is 600,000 million tons much or little? To answer this question let us put it another way: for how many more years can mankind continue its traditional practice of using irreplaceable resources? Estimates here are naturally very approximate ones, sometimes even contradictory. On the basis of their calculations of accessible resources scientists have established that mankind is assured of metal resources, for instance, for the following periods: aluminium for 570 years, iron—250, zinc—23, copper—29, lead—19 and tin—35. Some people think that by the year 2500 mankind will have exhausted the stocks of all metals, while the mining of lead, zinc, tin, gold, silver and platinum will cease by 1990, of nickel, molybdenum, wolfram and copper by 2000-2100

and of manganese, cobalt and aluminium by 2100-2200.*

The state of energy resources is attracting particular attention. This is quite understandable: the oil crisis that recently erupted and is far from having been solved showed or rather made many countries feel that a shortage of energy over enormous areas is something that may well happen.

Our planet has quite considerable resources of chemical fuel. With our present state of knowledge these resources are estimated to total about 12,800,000 million tons of standard fuel (TSF), of which coal constitutes about 11,200,000 million TSF, oil 740,000 million TSF and natural gas 640,000 million TSF. But the extractable amounts of these resources are much more modest, totalling 3,800,000 million TSF. This total includes about 2,900,000 million TSF of coal (more than a quarter of estimated reserves), 370,000 million TSF of oil (half the estimated reserves) and 500,000 million TSF of gas (about 80 per cent of the estimated reserves).

Noting that in 1973 world consumption of all energy resources, among which chemical fuel predominates, totalled about 9,000 million TSF and envisaging that this figure will reach 25,000 million TSF by the end of this century (such a forecast has been made) and that all energy requirements will be met solely by chemical fuel, scientists reckon that at the year 2000 level of consumption mankind should have sufficient coal, oil and gas for approximately 150 years.

But these estimates must be examined against the background of the changing trends in the world fuel-energy balance. Recent years have seen a marked prefer-

* K.V. Ananichev, *Environment: International Aspects*, Moscow, 1976, p. 37.

ence for oil and gas. From 1950 to 1970 consumption of gas increased by 450 per cent, of liquid fuel by 350 per cent and of coal only by 60 per cent. Oil provided 44 per cent, natural gas 18 per cent and coal 35 per cent of the world's fuel-energy needs. The relative importance of oil and gas was even higher in some of the developed countries, above all the United States, where in 1973 oil and gas provided 77.1 per cent of its fuel-energy needs. Without going into the reasons now for such changes and trends, we may note that they are considerable. This has caused many specialists to think that oil extraction will reach its peak in the 1990s and that by the year 2035 90 per cent of the world's prospected resources of oil and gas will have been totally exhausted.

The logic of the growth of energy consumption will appear particularly convincing if we set this growth alongside population changes. According to some estimates and forecasts the world population will total 6,400 million by the year 2000 (the 1975 total was 3,988 million), and 9,095 million by the year 2025. Even if we suppose that the consumption of energy per head will remain at the present level, the increase in the number of "heads" will nevertheless increase the demand for energy many times over.

Lastly, one should not overlook the state of soil resources and the ensuring of food supplies, a matter inseparably related to soil resources, as well as to population growth and the rise in energy consumption. Soviet researcher V. A. Kovda, has calculated that at the present time 1,500 million hectares, or 10-11 per cent of all the world's land surface, are under farm cultivation. If we include meadowland and pastures man is using 23-30 per cent of the land, and if we include productive forest—50-55 per cent. If we note that about 60 per cent of the land surface consists of land that produces little and that lies in climates that are either too cold or too

dry, then we must acknowledge that man is making quite thorough use of the soil cover of our planet.

A side-effect of this use is the loss of farmland. Every year the world is losing 6-7 million hectares of soil. These losses are practically irreparable, because the soil that is destroyed can be restored only over a period of several centuries and then only by a happy combination of many circumstances. And it is the most productive tracts of land which are the first to be lost, tracts lying in the black-earth belts, in the deltas and flood lands of major rivers. And this is at a time when more than 500 million of the world's population are not receiving enough nourishment to sustain normal health. This figure, by the way, is evidently an underestimate. According to data cited at the Second World Food Conference in the Hague in 1970 hunger and chronic under-nourishment are the lot of 1,000 million people.

These and many other developments linked with the interaction of society and nature and intensified by the chaotic nature of production growth in a considerable part of human society are creating *conflict situations in the economy*.

If the problem is viewed from a broader standpoint than that of economics, we find fresh cause for anxiety. Data from various quarters bear witness to the fact that changes which are still far from clear are taking place in the atmosphere, in the hydrosphere and also in the state of the land mass.

Every year we are throwing up into the atmosphere over 200 million tons of carbon monoxide, over 50 million tons of various carbons, about 146 million tons of sulphur dioxide, 53 million tons of nitric oxides and so forth. During the past 50 years the concentration of carbon dioxide in the atmosphere has risen by 10-12 per cent, while the content of solid suspended particles has risen by 12 per cent just in 10 years, from 1965 to 1975.

(About 20 million tons a year of solid particles enter the atmosphere every year.) A considerable portion of these particles stays in the atmosphere for from several days to several weeks. If they make their way into the stratosphere, they remain there for several years.

The result is to create a screen, as it were, for solar radiation. The transparency of the atmosphere is impaired, the stream of solar radiation reaching the Earth is reduced. The settling of dust on the Arctic and Antarctic icefloes may lead to their partial melting. The albedo, that is to say, the ratio of the light reflected by our planet to the light it receives, is changing.

Forecasts about how these changes may develop are still extremely contradictory. On the one hand, a constant and intense regime of dustiness may produce a cooling down and even an icing up. On the other hand, the accumulation of carbon dioxide in the atmosphere may produce a hothouse effect. The carbon dioxide functions in the atmosphere like the glass in a greenhouse: while letting solar radiation through, it does not let the infra-red radiation go back into space (this is that sinister spectre of the "hothouse effect" which scientists fairly often refer to). But it is clear that changes in either direction are by no means a blessing for mankind or for the whole biosphere.

Enormous quantities of various substances formed as side-effects and waste products of human activity enter the hydrosphere—the oceans, seas, rivers, lakes and underground waters. The magnitude of these effluents is slight compared with the total volume of the Earth's hydrosphere, but this is precisely a case where quantitative comparisons are inadequate for a precise description of the state of the Earth's waters.

According to current data the volume of water on our planet exceeds 1400 million cubic kilometres. About 94 per cent of it is concentrated in the ocean, part of it

in icefloes, in the soil (in the form of moisture) and in atmospheric vapour. The water which interests mankind, that is to say, fresh water above all, constitutes only two per cent of the total hydrosphere. In absolute figures this is also no small amount: approximately 28 million cubic kilometres. But these stocks are distributed extremely unevenly in the world, and part of them are inaccessible for use. And although the major centres of population have in the course of history arisen above all where there was a lot of pure fresh water, these are today the very places where there is the greatest shortage of water: the demand for water considerably exceeds the capacity of the most "settled" rivers and lakes.

This is not because there is less water. The total water intake amounts to little more than four per cent of the stable flow of rivers and subterranean waters. About one per cent is irretrievably lost. These amounts are, respectively, about 600 cubic kilometres and 130 cubic kilometres,* that is to say, magnitudes which at first sight it would seem one might ignore.

But only at first sight. The 470 cubic kilometres or so of effluent that returns to the hydrosphere is like a Trojan horse entering the rivers, lakes and seas. It bears with it kitchen waste, soap powder, hospital refuse, metals and acids, used engine oil, pesticides, nitrates and phosphates. It bears with it lead, cadmium, cyanides, mercury, scores of other substances which later accumulate in seaweed, in plankton and in fish and ultimately return to man again like an evil boomerang.

Purification plants are now being built at an increasing rate. But their building still lags behind the increase in water pollution. Apart from this, the extraction of impurities from sewage is not the same as the full rege-

* M.I. Lvovich, *The World's Water Resources and Their Future*, Moscow, 1974, p. 334 (in Russian).

neration of water: rivers and lakes are biological filters of water. In this respect we are still unable to replace their functions by purification plants. Even when it has been thoroughly cleansed, water can be dead water if some change has taken place in its simple but still not thoroughly divined molecular structure. Heavy water is a good instance of this.

Everything that finds its way into streams finds its way sooner or later into rivers. Everything found in river water ultimately reaches the ocean, which is the lungs of our planet, its unique heat regulator, an enormous factory for producing food for man, as well as an all-embracing transport artery. Part of the refuse disintegrates in sea water, part settles to form deposits on the ocean bed while part proves resistant to the impact of sea water and spreads over great areas. The ocean can no longer serve mankind as a dumping ground—this becomes increasingly plain as the years go by.

But there are quite a few waste products of man's activity which enter the ocean directly, by-passing the rivers and lakes. These include, above all, oil. Every year more than 1,500 million tons of oil are transported by sea—it is precisely the ocean which links many oil sources with the main oil consumers. In the late 1950s experts reckoned that about two million tons of oil find their way into the ocean every year. By the late sixties this figure had increased five times: about 1,000 million tons of oil were being carried by sea and one per cent was finding its way into the sea. In absolute figures this is ten million tons. By the mid-seventies this figure had reached 12-15 million tons. A "normal" loss of 12-15 million tons, apart from tanker accidents and the bursting of wells in shelf zones!

Public indignation at sea pollution is most often aroused when people see beaches fouled and spoiled for holiday use. But that is, so to say, only the tip of the

iceberg. Oil-polluted seas promise unpleasant consequences not only for swimmers. The oil "carpet" extending over thousands of square kilometres chokes "the Earth's lungs", it prevents the ocean absorbing carbon dioxide, it changes the process of evaporation from the ocean surface, it poisons the plankton and reduces the productivity of phytoplankton photosynthesis. The presence in a litre of water of only 0,01 millilitre of oil already spells death to the spawn and fry of many species of fish. And although the surface film of oil is not long-lasting, the ocean does not easily "get rid" of it. Broken up by waves, it emulsifies, gathers in drops and lumps, sinks to the depths where it poisons the lower strata of water and their fauna, while later on storms or currents may bring it to the surface again to cause renewed harm.

Let us, finally, return to the foundation of human life—the land and the soil. Loss and destruction of the soil are of more than just economic importance. Everything on Earth which we use as food or energy is solar energy transformed by the green mantle of our planet and by the ocean. (It is only recently and on a still insufficient scale that man has started using an energy source outside the biosphere, namely, the atom.) The level of photosynthetic activity of the biosphere directly depends upon the quality and quantity of the planet's green mantle, which in turn depends upon the state of the soil. And one does not need to be a prophet to divine that very soon this dependence will become a key question and not just of biology. For mankind today is expending the potential energy of the biosphere almost ten times faster than it is being accumulated by the organisms trapping solar energy on Earth.

The qualitative changes in the productivity of the biosphere as a result of man's activity are of a truly geological character. The yield of cereals, which was 6-7 centners per hectare from the fifteenth to the

eighteenth centuries, rose in the industrially advanced countries to 16 centners per hectare in the nineteenth century and to 30-40 centners per hectare in the mid-twentieth century. By the end of this century scientists think yields may rise to 60-70 centners per hectare.

Arable land is steadily encroaching on forests. The Earth's covering of forests is at least 60-65 per cent less than in prehistoric times. The carbon trapped in the forest's biomass is swiftly entering the atmosphere in the form of carbon dioxide. The biological circulation of carbon, nitrogen, phosphorus and other elements is accelerating. It is an acceleration, perhaps, of the order of one or two times, since the life duration of trees is centuries or even millennia, while grass vegetation lives for periods of months or two to three years.

If we again set alongside all these developments the fact that the world population is increasing every day by 250-280,000, that the "pressure" of society on nature is consequently steadily increasing on a worldwide scale, that every year people are throwing into the sea, the soil and the atmosphere large quantities of radioactive and toxic substances which take a long time to disintegrate; if we note that several countries are exploring the possibilities of waging ecological or geophysical warfare (the possibility of instigating typhoons and hurricanes, floods and droughts on enemy territory, of breaking holes in the ionosphere to allow ultra-violet radiation to strike particular parts of the Earth and so forth); if we recall the unusual weather conditions, observed in recent years, which some scientists not without reason ascribe to the side-effects of human activities; if we add that the radiation of the Earth in the one-metre wave band has come to equal solar radiation (a phenomenon of truly cosmic proportions), and that virtually no free radio frequencies remain, then we may obtain some idea of the situations which I call *geological conflict situations*.

characterising the state of our planet as a whole.

If the Earth could speak, it would have every right to tell us: "You are consuming my body." Man is nourished by sunlight which the biosphere of our planet has transformed into particular produce. We are consuming the Sun-nurtured "body" of our natural environment, and nature itself is, in Marx's words, our "inorganic body".*

Our life depends upon the state of this "inorganic body", upon its health and prosperity. This dependence of ours is manifested both in indirect forms—through factory and farm production, and in direct forms—through food, air and water and through recreation (or lack of it) in the countryside.

It is already obvious today that the equilibrium of biospherical processes which has been disturbed by man's economic activities, is being restored more slowly than ever before and that many of the biosphere's adaptation mechanisms are being strained to the limit. This overstrain is the basis for the possible emergence of extremely adverse changes both in the biosphere itself and in the physical condition of human beings.

It is an indisputable fact that thanks to man's efforts and to brilliant triumphs of his intellect many sicknesses have been overcome and his living and working conditions are incomparably healthier than they were until recently. But we must take notice of other developments too. The growth of industry and of cities, the increasing mechanisation and automation of production, the rapid expansion of chemistry, environmental changes, the acceleration of the rate of changes in the world surrounding and affecting man, and the heightened psychological and emotional intensity of the lives of millions of

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 3, Moscow, 1976, p. 276.

people may contribute to and are contributing to the emergence of new sicknesses or they may produce new variants of sicknesses familiar in their "classic" forms. Over the past century many previously unknown sicknesses have been discovered and have arisen—infectious diseases with specific epidemic and practical features, genetic diseases with even more complex prophylactic problems, endocrinous, allergical and toxic sicknesses, including radiation sicknesses, and toxic-allergical ones, increasing with the appearance of a mass of new chemical substances.

In other words, one of the most important consequences of human activity, consequences which are far from always foreseen or desirable, is the formation of an environment with a number of new material and technical, chemical, radiation and psychological components. This new environment, in turn, is having a new impact on man, different from that of the natural environment—new reverse reactions, and links in the "man-nature" system are emerging. This is manifested in the sometimes intolerable tenseness with which people are forced to adapt themselves to the accelerated changes in the environment. It is manifested in the "retreat" of the human body in the face of new substances which, after man himself has introduced them into the biosphere, prove to be toxic and abiotic. It is manifested in the restrictiveness, which *Homo sapiens* increasingly feels, of the confines of man's physical existence upon the planet Earth. The "zone of comfort" of the natural environment was always extremely restricted and the human possibilities of altering and even further narrowing its limits have now become truly unbounded.

A tragic event, symbolising the considerable gap between the quality of the environment needed for the normal life of man as a biological creature and the actual possible quality of this environment, was the poisoning

of several hundred Japanese and the death of one hundred by methyl mercury in a small fishing village in Minamata Bay. Thus did a new human affliction—Minamata sickness—announce itself in the late fifties.

It was later learned the Minamata sickness was not unique. In 1964, 200 people living on the banks of the Agano River on Honshu Island in Japan were taken ill with “secondary” Minamata sickness. Ten people died. Water had been poisoned by effluent from a chemical plant. The world soon learned of “itai-itai” sickness, caused by cadmium-polluted water and killing half of those stricken by it. And it is quite probable that man will have more unpleasant encounters since still quite large quantities of chrome, lead, molybdenum, nickel, zinc, copper, mercury and many other micro-elements are being cast into the water and the soil. The impact of these micro-elements on the human body is deceptive and hard to foresee. It usually takes many months, years or even generations to become apparent. Some of the Japanese children born in the zone where the water and soil was contaminated by mercury were found to be congenitally suffering from Minamata sickness. Today man indeed does not know what he is passing on to his children.

But unfavourable changes in the biosphere affect not only man. In conditions which worsen the environment for *Homo sapiens*, animals are also bound to suffer. And conversely, any worsening of the conditions of life for animals adversely affects in one way or another the physical existence of man.

And it is not just a question of a worsening of conditions in the areas where animals live. Man always makes inroads on nature with a particular aim. Nature, one might say, has always appeared to him in the form of useful minerals, logs, planks, pure water, meat, hides, feathers and so forth. In the pursuit of their aims people

have not until quite recently given much thought to whether nature is managing to replace the objects of plunder.

The international Survival Service Commission laboured for many years to compile its now famous *Red Book* of wildlife—a list of animals, birds and plants that are rare, disappearing or threatened with extinction. Simultaneously the commission compiled a “Black List” of flora and fauna that have vanished from the face of the Earth since 1600 (no reliable data exist for the previous period). It appeared that 36 species of mammals and 94 species of birds had irretrievably vanished from 1600 to 1970.*

A much greater number of birds and beasts are on the verge of extinction. As of January 1, 1972, for instance, Volume I of the *Red Book* listed 236 species of mammals and Volume II, 287 species of birds.

There are, unfortunately, quite a number of people who do not think these figures very significant: “But we thought thousands of species were involved!” But man first of all “crowds out” precisely those wild animals which play by no means an unimportant role in ensuring his own vital activity. Above all man is here losing an additional and virtually gratuitous food source. Then an industrial resource: ostrich feathers, hides, horns, tusks, whalebone and whale oil are raw materials of industry. And lastly the mechanisms for the regulation of biological processes are disturbed: man has, for instance, most resolutely destroyed his rivals—beasts of prey—in the struggle for animal food, and only in recent years has he begun to realise that they play a far from elementary role in nature.

What I have said here does not, of course, exhaust the

* J. Fisher, N. Simon, J. Vincent, *The Red Book, Wildlife in Danger*, New York, 1969, p. 11.

problem of the biological tension which has arisen in many parts of the Earth as a result of man's activity. Matters calling for serious thought are the pesticides that penetrate everywhere, the psychological pressure of large masses of people, so clearly manifested in the nervous exhaustion of people living in overpopulated cities, the surfeit of information people receive, the change in the behaviour of certain animals and their mutation. Yet what I have said already gives the reader some notion of *biological conflict situations*.

Man has always consumed certain natural resources which he needs. But only in recent times has it become clear that the consumption of a particular resource prompts a complex reaction in nature. The rupture of one or several links in its system leads to a restructuring of the whole system at a new level. And nature, in Engels' words, in the first place brings us the results we expect but in the second and third places it has quite different, unforeseen effects which only too often cancel the first.* Biological conflict situations are one of these unforeseen results.

Perhaps one should regard as an unforeseen consequence of the environmental crisis the fact that the contemporary state of the utilisation of nature has ceased to be a matter of interest only to the natural sciences and political economy. The destruction of the environment in certain regions of our planet has acquired the character of a natural calamity. The damage which the environmental crisis has caused to the economies of several highly developed capitalist countries is today calculated in thousands of millions of dollars. The shortage of natural resources slows down the reproduction of social wealth, and the quality of the natural surroundings is

* Frederick Engels, *Dialectics of Nature*, Moscow, 1978, p. 180.

becoming as important a social characteristic of society as the level of income and per capita consumption of goods.

The most striking expression of this is the way well-to-do people have fled from the epicentres of the environmental crisis—the big cities. With the same insistence with which they once strove toward the centres of New York, Chicago, Pittsburg, Los Angeles, London or Rome they are today pressing to get closer to what of nature still remains. The former advantages of living in the centre of town—the proximity of cultural, business and commercial establishments and of entertainment, the better provision of comforts and communications—today in the age of television, of progress in the sphere of services and of new means of transport has largely lost its importance. They save time and money too, as before. But even more do they safeguard their health.

This is on the whole understandable and in itself justified. The trouble is that, like the saving of money, the safeguarding of health is frequently achieved at other people's expense. The degree of pollution of the air in big American cities, for instance, is 3 to 4 times higher in districts where mostly workers live, than in districts where capitalists live. The incidence of illness among working people rises sharply and this in turn affects the level of their wellbeing.

The environmental crisis gives birth on quite a large scale to a new form of directly robbing the masses of health. Industrial waste was, of course, thrown into rivers, lakes and the atmosphere before too. But, in the first place, the volume of such waste was not so great and nature was able to cope with it, secondly, the toxicity of the waste was considerably less than it is now, when synthetic materials are produced on a truly vast scale and, thirdly and lastly, the frightening consequences of the pollution of water and air were, it seemed,

only suppositions and were regarded as the "invention" of idle professors. It has now become clear that nature is already powerless to handle certain by-products of man's activity and that many waste products are poisons and their impact on the environment and on man himself is simply lethal. But the thirst for profit, for wealth and for rising through wealth to power over others in order to seize even greater riches, at times obscures these clear notions.

In West Germany, for instance, there has already been more than one national scandal in which it has been shown that industrialists were simply dropping extremely dangerous poisonous waste down the drains or onto ordinary refuse tips. In 1971 at Bochum-Gerthe thousands of barrels were found hidden filled with waste material containing enough prussic acid to poison 250 million people. In 1975 similar "dumps" were found at Limburg near Offheim, at Meudt near Montabaur and also near Munich. Industrialists go to any lengths—from bribes to false invoices and false labels—to save on the transportation of waste and on payment for its destruction. They are little concerned about the consequences. Moreover, in reply to trade union demands that they should draw up, at last, principles of responsibility for producers, the producers, in particular the Chemical Industry League, issued a statement that those for whom the product is made were to blame for the appearance of waste.

The environmental tension arising in many densely populated regions of the globe prompts people to go to the countryside. One of the greatest needs of man in the age of scientific and technological revolution is to rest far from the city din, to have minutes of solitude, to commune with a tranquil forest and gently flowing stream, it is a need for bird song and the rustle of grass, the beauty of flowers and interesting encounters with

the unknown. But in advanced capitalist countries it has become by no means easy to meet this need. More often than not in the places where one can rest, stroll through woods, swim in the sparkling sea, sunbathe on a clean beach or pitch a tent by a stream flowing near a town and by some miracle remaining unpolluted, a notice has been put up saying "Private Property". All has been occupied and bought up.

Millions of people above all those living in the major industrial centres of Western countries, have felt the impact of environmental problems on their own physical and mental state. The spread of illness, the shortage of recreation zones, the appearance on the streets of automatic air-vending machines are striking testimony to the fact that the rapacious exploitation of nature and unplanned industrialisation and urbanisation are turning into a social evil the like of which mankind has not yet known. And masses of people are legitimately reacting to this evil. Reviewing the traditional criteria of the quality of life, working people are realising that an antagonistic society has devised wholly new forms of robbing them. The "free boons" of nature have become by no means free. Whereas previously a capitalist would simply appropriate them by drawing them into his production process, now he has become the complete master not only of their economic but also of their environmental essence. For the working people this metamorphosis has become a factor increasing their spending on medical treatment and recreation, food and transport.

And this is only one aspect. It is not hard to see what problems a fisherman, for instance, runs up against if the effluent of a modern chemical plant pollutes the sea. His dangerous toil over a period of many days, his good haul of fish, his hopes of a good income—all this vanishes into thin air when the sanitary inspector declares that the content of pesticides or mercury in the fish exceeds the

norm, when the customer, sniffing the fresh fish, says it reeks of petrol, when a few days later it appears that the fisherman has brought ashore a hitherto unknown poison and has been the indirect cause of the severe illness of hundreds of people. Nobody has actually robbed the fisherman of the sea, but all the same he is losing it as an object of his labour and a source of livelihood.

In such circumstances people inevitably become aware that a crudely utilitarian, profit-seeking, capitalist attitude to nature directly concerns the position of the mass of the people and affects their life, health, welfare and daily life, and also their physical and mental growth. Working people ever more clearly realise that such an attitude to nature is not some insignificant side-effect of industrial growth in an antagonistic society. In the countries which are the "showcase of capitalism"—the United States, West Germany and Japan—there has been more than one wave of "environmental strikes", which have announced to the world the emergence of a new front of class struggle. The crisis of the environment has, in the words of Barry Commoner (*The Closing Circle*), put the spotlight on old economic, social and political problems and it has given rise to *social conflict situations*.

Is it within the power of mankind to overcome all these conflict situations that have arisen as a result of its own activities? The colossal technological and intellectual might of the world of man can with almost equal effectiveness be directed toward the destruction or toward the restoration and protection of nature. But the global character of the problem calls for efforts of a global character, efforts that are not just general but also co-ordinated on a worldwide scale.

It is this which proves to be the most difficult task. It would appear that all countries and nations, all states

and governments are interested in protecting the natural environment of human existence. Today virtually the whole world acknowledges that the environmental state of our planet Earth is under great strain. But the more attention the environmental crisis draws to itself, the clearer does it become that there are quite a few "protectors of nature" who not only prefer to remain on-lookers but also try to cling like parasites to the general plight of mankind and to derive financial gain from it, who raise a thick "environmental smokescreen" under which the essence of the problem sometimes vanishes without trace. This fact, its unseemliness and inhumanity help to reveal the real background and profound social meaning of the environmental crisis: the crisis in the relations between man and nature is a consequence of the crisis in relations between people. It is obviously not determined solely by social factors, but it is precisely social factors that at the present stage of civilisation permit or prevent the bringing about of that radical turn in the relations of the world of men toward the world of nature which has long been overdue, which all mankind needs and examples of which mankind already has in the practice of socialist utilisation of nature.

*Close to the ploughland, by the road,
Where iron on the anvil smokes,
Plying a craft that's ages old
The mighty smith beside the fire
Is hammering with sweeping blows
The pallid and enormous blades
Of patience that shall never tire.**

* Emile Verhaeren, *Les villages illusoires*, Leipzig, 1913, p. 55.

II. ECOLOGY AND IDEOLOGY

What is your money-making now? what can it do now?
What is your respectability now?
What are your theology, tuition, society, tradition,
statute books now?
What are you jibes of being now?
What are your cavils about the soul now?

Walt Whitman

Their handling of ecological problems provides yet another striking illustration of the skill with which capitalists mould public opinion. While paying due tribute to the important measures of environmental protection which have been and are being taken in the industrially advanced countries of the West, it is important to stress the following: the capitalists, having promptly realised that pollution of the environment brings the danger of great social upheavals, are insistently trying—sometimes not without success—to turn this danger to their own advantage.

A tremendous fuss has been raised about environmental problems. A mass of suggestions appears as to how to solve the ecological crisis. It becomes an effective way of winning votes: some politicians present it as an innocuous problem, others as a sinister, inescapable threat to the system of free enterprise. Responsibility for it is ascribed to the population explosion, to technology, to man's biological cruelty or to his misbehaviour. Religion and politics are blamed, charges are levelled against today's industrial society, against socialism and,

lastly, against ecology itself.

In the midst of all this fuss bourgeois theorists have managed to take up quite active positions and not only to find a new way of brain-washing the masses but also to create several methodological and philosophical conceptions which present the environmental situation in a light favourable to capitalism. The problem of the environment is most often portrayed as an "artificial" and "contrived" one, bearing no relation to the working people's everyday interests. At the same time bourgeois theorists are instilling in people anxiety about the preservation of nature in the socialist and developing countries.

Asserting that the ecological crisis is an inevitable consequence of human history and does not depend on social and economic relations, Western propaganda seeks to prove that nature protection is "above politics". Ecological problems are presented as being "above" society and classes, therefore the bourgeois class and capitalism are not to blame for their emergence. At the same time the nature conservation measures which the monopolies are forced to undertake are given such publicity that the capitalists appear to become the principal champions of the destinies of mankind.

The Communist Parties and progressive forces in the advanced capitalist countries consistently explain the political import of questions of the utilisation and protection of nature, showing that the struggle against pollution of the environment can succeed only if it becomes a part of the struggle for social transformations and they reveal the link between the ecological crisis and the general crisis of capitalism. For many Communist Parties their speaking out in defence of nature is speaking out against the world of private property, against the spoliation of nature, the inheritance of all mankind, and against oppression and exploitation.

The progressive press lays bare the true reasons for the attention the capitalists are paying to environmental problems. Certain monopolies which control mainly the most modern branches of industry have discerned in defence of the environment a new way of enrichment and of struggling with their competitors whose production methods involve greater harm to nature. Groupings of monopolies have been quickly formed to get government organs to introduce counter-pollution measures involving the production of expensive technological equipment, the conduct of major scientific research and so forth. Numerous public organisations for environmental protection have been mobilised or artificially re-established to enable the monopolies to hide their profit-seeking ecological policy behind a public movement.

But those monopolies which have lost the battle against the new environmental protection laws have also energetically set about demonstrating their concern over the ecological crisis. In this connection they start from the view that the state will bear the relevant cost of solving the crisis by granting them appropriate subsidies. In this way the state is given the role of treasurer who at the taxpayer's expense pays compensation to both winners and losers in the rival struggle. The cause of environmental protection which is of benefit to all thus affords the capitalists a new opportunity to rob the masses of the people.

It is understandable that far from everybody should always truly be aware of the real reasons for the destruction of nature. Above all, this is because in capitalist countries communist and capitalist propaganda enjoy by no means equal opportunities. The mass media at the disposal of the capitalists enable them to present environmental problems to a considerable section of the population in a light favourable to themselves. Thereby public opinion is given a particular orientation and views

are foisted on it which the bourgeois theorists use as the basis for their explanations of the ecological crisis and their recommended solutions.

Foremost attention is given here to the scientific and technological revolution. This is on the whole natural and springs from the actual state of affairs. The environment has shown the limited nature of its capacities above all against the background of the swift growth of changes linked with the scientific and technological revolution—the upsurge of industry and city life, and the intensified use of land. But on the basis of these real changes bourgeois theorists propose solutions which cannot produce radical results.

Their starting-point is fairly elementary: the scientific and technological revolution is considered as something existing on its own, apart from social conditions, and it is declared—at different times—to be now the sole saviour and now the principal destroyer of nature. By the way, whereas the first view prevailed until quite recently, the early 1970s saw the marked triumph of the latter view. The rosy optimism prompted by the successes of the scientific and technological revolution has begun increasingly to yield to anxiety at its unforeseen social, political and ecological consequences. The “technological imperative” is losing ground to the “natural imperative”. And public opinion in the capitalist countries, analysing the “ecological role” of science and technology, is beginning to take up arms against them with the same passion with which in the 1960s it exalted them as the keys to the “golden age”. A number of bourgeois theorists regard the scientific and technological revolution as a curse on society. Groups of experts are urging a renunciation of science which is “costly and futile” and of “destructive technology” and are proposing a return to the “simple life” of the past, to the life of feudal times which would, they say, allow the unity of

man and nature to be restored.

Capitalist theories of the role of science and technology in harmonising the relations between society and nature are the methodological basis of some conceptions that have sprung up in connection with the ecological crisis. The "technological optimists" who stress that science and technology are developing both under capitalism and under socialism, draw this conclusion: the scientific and technological revolution will save nature irrespective of the social and economic conditions in which it occurs. Consequently, according to this point of view, the main thing is the need to develop science and technology as rapidly as possible, to quicken the rate of economic growth, that is to say, to advance more quickly along the road which has, in fact, led us to ecological crisis.

Their opponents, the "technological pessimists", who blame the scientific and technological revolution for unprecedented destruction of the environment, likewise ignore the social and economic conditions and the circumstance, discovered by Marxism, that a "particular relation of man to nature is determined by the form of society and vice versa"* . Thus both the former and the latter essentially deny the necessity of social transformations for the radical improvement of the utilisation of nature and they ignore the discrepancy between the level of technology that has been achieved and the social relations of capitalism.

It is easy to see the reactionary role played by technocratic conceptions of harmonising the interaction between society and nature. It is not simply that placing one's trust solely in scientific and technological progress condemns people to wait passively for improvements in

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, Moscow, 1976, p. 44.

the utilisation of nature. It is also clear that there can be no return to the past, that capitalism has no intention of renouncing the use of science and technology and is powerless, no matter how much contemporary Luddites might desire it, to slow down the scientific and technological revolution. The ideological function of technocratic treatments of the "nature-society" problem lies above all in proposing false solutions while one-sidedly reflecting the most important and truly acute issues of the present time. Such false solutions suit the capitalists, they permit bourgeois society to reproduce its social relations and testify to the fact that worship of technology, in whatever guise it appears, invariably provides theoretical arguments in support of modern capitalism.

Technocracy, accepting the world to be in the control of all-powerful industry and conceiving the future of human society in terms of tons of metal, numbers of cars and metres of cloth, has given rise to finalist conceptions of the interaction between nature and society. Extrapolating into the future modern methods and rates of growth of the consumption of natural resources, bourgeois futurologists have obtained indices of the utilisation of nature which patently exceed the capacity of our planet Earth. This has given rise to numerous "theories" of world economic collapse and social and political complications, to forecasts of future chaos, famine and so forth.

In the quests of the futurologists one should certainly see the value of attempts to work out a quantitative model for the advance of the modern world, as well as the incorrectness of applying to all countries the utilisation of nature as practised in the highly developed capitalist countries, and also the possibility of finding more effective solutions even within the limited frameworks chosen by the authors of these studies. It is also an obvious fact that finalist theories of an ecological

nature are organically interwoven with finalist constructions of a more general philosophical and sociological nature, at the root of which lies the notion of the fatal inevitability of "judgement day"—of the destruction of mankind. I would like to stress, however, that the scientific worth of these studies has little connection with the ideological constructions based upon them.

Ecological science has with surprising rapidity ceased to be socially, politically and ideologically neutral. It has become a formidable weapon with which everybody today wish to be armed. But special eagerness is shown by capitalist propaganda in this regard. Western theorists make exceptionally wide use of studies whose authors, in their analysis of the present-day utilisation of nature, arrive at pessimistic conclusions. These conclusions are worked up by propaganda means and presented to public opinion without any regard for the particular character of the society whose utilisation of nature forms the basis of the studies. Seen in the magical light of figures and formulas, as it were, and backed by the scientific authority of a particular expert, propaganda of this kind is often extremely effective.

The idea of a "world equilibrium", for instance, which some experts have put forward as a sort of hypothesis, has gained almost categorical significance in the pronouncements of capitalist propagandists. This idea has given them the opportunity of proclaiming economic growth to be "absurd": they claim that by renouncing economic growth the world will become more stable, society closer to equality and there will be greater harmony in man's relations with nature.

At first sight it may seem paradoxical that the theorists of a class, for whom the expansion of production is something like an end in itself, should be proposing the ceasing and "humanisation" of economic growth as a principal requirement for bringing into harmony the

relations between nature and society. Such an attitude towards economic growth is all the more remarkable in that until quite recently bourgeois theory set quite the contrary interpretation upon it. Was it not from the "idea" of economic growth that such doctrines as "the welfare state", "the consumer society" and so forth arose, the basic function of which was to stimulate consumption in every way, as the most important factor ensuring unceasing and unlimited economic growth? ! For many years after the Second World War economic growth was thought to be a panacea for all the social ills of the capitalist system, a guarantee of the Western world's prosperity and a means to solve all social problems. But unemployment, inflation, the intensified exploitation of the working people and, lastly, the deterioration in the quality of life consequent upon damage to the environment refuted the universal sense of economic growth which capitalist propaganda was making so much fuss about. And many Western theorists passed from praising economic growth to blaming it.

Everything falls into place if we take note of the fact that their calls to renounce economic growth are addressed *to the whole world*. They ignore the fundamentally different significance which freezing production levels has for the United States, West Germany, France, Japan or Britain and for, say Uganda, Bangladesh, the Republic of Chad and other developing countries.

For the former it means maintaining a high level of production and consumption, for the latter—the keeping of a low level. For the highly developed countries it means the possibility of continuing to keep the developing countries as sources of raw materials, while for the developing countries it offers the sorry prospect of remaining the objects of imperialist plunder. If we take note of the fact that 20 per cent of the world's population live in industrially developed countries and consume

80 per cent of the world's natural resources, at the same time causing about 90 per cent of the world's devastation and pollution, then it will become clear that capitalist propaganda, in putting forward the idea of the "absurdity of economic growth" and in making no distinction between the highly developed and the developing countries, urges that some should retain the right to continue wreaking havoc in the world of nature, while others should continue to serve as a zone for the regeneration of environmental resources. It is seeking to freeze the *status quo* of the world today and to perpetuate the gap between the rich and poor countries.

There is a similar unscrupulous juggling with ideas in the assertions of capitalist propaganda that deterioration of the environment is the inevitable result of man's insatiable urge to consume. The roots of the ecological crisis are thus said to lie not in the production sphere but in the distribution sphere, and so the crisis can be solved by simply re-examining and altering man's requirements.

This is another subtle ideological move, the skilful substitution of a phoney problem for a real one. Industrial consumption of natural resources, which is indisputably the root cause of the environmental crisis in the Western world, is pushed into the background by capitalist propaganda, which brings to the forefront individual consumption! If industrial producers do indeed pollute the environment, the sole blame lies with the consumers who want to obtain a variety of commodities at competitive prices. Such a posing of the question, of course, completely absolves the producers of any responsibility for spoliation of the environment and gives them the moral right to raise prices if they have to bear the costs of particular environmental protection measures.

The capitalists in Western countries, especially in the

United States, have gone to great efforts to create a cult of consumption, to turn man into a slave of commodities and inculcate in him consumer patterns of thought and behaviour. The judging of men by their "market value", the pitiless attitude of society towards "failures", the replacement of the individual personality by a set of advertisement-moulded qualities, requirements and ideals, which more often than not prove to be consumer ideals, all this has been cultivated for decades.

One should not, of course ignore historical factors—the impossibility of thoroughly utilising natural material, the inadequacy of our knowledge of nature, the imperfections of technology and so forth. But neither should one ignore the fact that the expenditure of natural resources at any particular stage in the development of productive forces has always been determined by no means solely by the demands and needs of man, but also by the type of society and by the character of social relations. In the United States, for instance, according to some estimates in the period from 1929 to 1963 about half the natural resources developed during that time were expended without regard for people's actual needs.

And no doubt one of the most appalling results of this is that many people today judge others by the make of their car, by the district in which they live, the number of rooms in their homes and the number of lapdogs in the rooms. And limousines speed along the highways with engines from four to five times more powerful than necessary, consuming petrol accordingly and polluting the air accordingly, that pretentious, inconvenient and uneconomical but "prestigious" private residences are built, that the furnishings are renewed to suit the current fashion, and so forth. The consumer is to blame, but who is to blame for that fact?

In other words, capitalist propaganda again overlooks the fact that man's needs are moulded by society. Once

again we find it ignoring social conditions.

It is characteristic of capitalist propaganda that, reiterating the issue of controlling individual consumption, it should proceed to talk about people in general. It does not tell us precisely who should start to control his consumption and how—the millionaire or the unemployed worker.

A very important political and ideological point of the call to review consumption lies in capitalist theorists' remarks, addressed to all mankind, that there are too many people on this planet and that they are "devouring" the environment. Bourgeois ideology sometimes calls for political pressure to be applied to make other countries to implement programmes of birth control. And it is especially characteristic of such appeals that among those expressing the greatest public concern we find D. Rockefeller, leaders of the Ford Foundation and of the Carnegie fund and wealthy families in Britain, Sweden and other Western countries.

That population problems have become extremely acute in recent times is indisputable. But it is also an indisputed fact that dictatorial steps and a global approach have no future here. Each country conducts its own population policies in accordance with its own historical path, culture and popular traditions, in accordance with its economic possibilities and the aims it sets itself.

The attention of the capitalists is drawn to population changes above all by the fact that world capitalism no longer has any need today of a supplementary work force. And the work force which it cannot master, subordinate to itself and include in the sphere of its own influence constitutes a direct threat to its existence. In the growth of population the capitalists sense not only future upheavals in the political stability of the countries which supply raw materials, but also a change in their

role for objective reasons. Where there are more people, a country consumes more of its own resources, the monopolies' possibilities of disposing of raw material, oil and ores are reduced. For this reason the population explosion was branded as the reason for the emergence of slums, as a brake upon economic growth (there is no mention here of the fact that economic growth should be reduced to zero!) and as an obstacle to ensuring the welfare of the masses and improving the environment. The ecological crisis has thus offered a new excuse for urging a population policy suiting the capitalists, although size of population is far from the sole or most important factor determining pollution of the environment and expenditure of natural resources.

The manner in which bourgeois ideology explains the ecological crisis is a very clear illustration of the way the class of exploiters attributes the damage done by its own practices to any cause whatever, provided it bears no relation to themselves and does not infringe upon their dominating position. Environmental problems are indeed acute and alarming ones. The general public is showing, one might say, exceptional interest in them. And bourgeois ideology, taking advantage of this interest, is offering a variety of reactionary and utopian solutions which pursue essentially one aim: to make the mass of the people accept the view that capitalism not only is not to blame for destroying the natural basis for human existence but is alone able to save it.

That is the basic social task which today's bourgeois ideologists specialising in analysing the "nature-society" problem are called upon to fulfil; that is the ideological point of the idea of the stagnation or humanisation of economic growth, of the charges of destroying nature laid against science, technology and a high birth-rate, of the substitution of individual morality for industrial consumption and so forth. Aware of the fact that the crisis

of the environment is one of the most important elements of the general crisis of capitalism. capitalists are accordingly reacting to it and trying to assume control of the movement for nature protection. This would enable capitalism not only to conceal its own historical responsibility for the degeneration of the environment but also to make new ideological and material gains: on the one hand to don the attractive mantle of defenders of nature and on the other to foist upon public opinion the view extremely popular with bourgeois ideologists that everybody—both producers and consumers—are involved in pollution so everybody too must pay for it, and to make broad sections of the population shoulder the burden of paying for the protection and restoration of the environment.

The foreign policy propaganda of the capitalists is becoming a separate trend in their ideological handling of the “nature-society” problem. Here stress is laid on emphasising in every way that environmental problems “transcend” class and national factors—which does not, however, prevent Western propaganda from using these problems as a class and theoretical weapon. The strategic positions of imperialist policy and ideology are now being equipped with this weapon.

The basic method is quite simple: the historic destiny of mankind is identified with the destiny of capitalism. The maintenance, strengthening and development of capitalism is presented as the progress of civilisation as a whole. From this viewpoint the ending of the world of exploitation and oppression appears as virtually a catastrophe for the whole of mankind. Basing itself on such a view and usurping the right to speak “for mankind” and “in defence of civilisation”, capitalist propaganda presents all the peoples of our planet with something like an ecological imperative.

The developing countries are becoming the object of

its closest attention. Bourgeois ideologists are trying to mould the view that the developing countries in consolidating their national economies and their own industries are above all destroying nature and that these very actions of theirs are particularly dangerous in an ecological respect.

Here too one could say that again an attempt is being made to adapt a genuine problem to serve imperialist interests. It is a fact that some developing states are ensuring their economic progress while as yet ignoring questions of nature protection. The leaders of these states have first of all to deal with such problems as famine, poverty, unemployment, illiteracy and scientific and technological backwardness. In such conditions it is hardly possible to make any considerable allocation of funds to nature protection. The shortage of funds is aggravated by the hastiness and lack of comprehensiveness with which natural resources are tapped, by the use of outdated technology, by the low level of science, the extreme character of natural conditions and so forth.

But capitalist propaganda, pointing arrogantly to the environmental problems of the developing countries, remains silent about the root causes of these problems and sees in them no link with colonialism and the colonialist outlook. The main reason for the ecological tensions arising in some young states is the material and cultural plundering of the colonies over many centuries and the unbridled exploitation of "foreign" lands and resources. Moreover, such tensions are frequently to be observed where national industries have not yet sprung up, where the oil extracting, mining and chemical enterprises of Western powers have been and still are operating. Moreover, the recent period has seen a particularly dangerous imperialist practice in Asia, Africa and Latin America: the monopolies are moving to those continents enterprises that pollute the environment most of all.

This gives them both economic gains (resources and labour power are cheaper there) and ideological gains (the capitalist who shuts down such an enterprise in his native country can publicly demonstrate his concern for environmental protection), although as far as nature is concerned this "ecological colonialism" merely amounts to transferring the sickness from one part of our planet to another.

It is now obvious that some highly developed capitalist states are not only exporting their ecological problems but are ever increasingly living at the expense of the natural resources of other countries. And "other people's nature" is being consumed without any particular concern for what their owners will be left with or for the harm that will be done to the biosphere in that particular region and, consequently, to the whole planet. But this is being done, of course, on "good grounds": are we not reallocating industry, they say, and spreading technological knowledge?

Here the monopolies have no scruples about saving money on purifying industrial effluent. According to McGraw-Hill economists the percentage of total capital investments which American industrial firms spend on purification installations is 8.8 per cent at their domestic plants and only five per cent at their plants abroad. The most significant difference is in those very branches of industry where there is the greatest discharge of polluting or poisonous waste into the environment. To this must be added the export of "dirty" technology and of substances barred for use in the exporter-countries. Thus the use of chlorinated hydrocarbons, mercury preparations, arsenic compounds and pesticides is restricted or totally prohibited in many capitalist countries, but the export of such substances is virtually unrestricted and enormous consignments of them are despatched to developing countries.

Bourgeois propaganda sometimes hypocritically complains that some leading figures in the developing countries are willing to barter their backwardness for "our pollution", or that some young states are powerless to cope with "poaching". In this connection it tries to close its eyes to the major factor that capitalist practices in the utilisation of nature could not help but influence the national bourgeoisie in the developing countries, and give rise to a certain copying of their example, and that poaching is aggravated by the present-day safaris of white folk who fly across two oceans in order to fire what is virtually a weapon of war at one of the last remaining exotic animals and, while they are about it, to buy trophies from local poachers. All this lies beyond the range of the tasks of capitalist propaganda. Proclaiming that the developing countries may undermine the equilibrium of the planet if the West does not undertake to defend nature, it simply conceals the long well-known striving of capitalism to hold on to the markets for cheap raw materials, to keep the developing countries within its own sphere of influence and ultimately to deprive the young states of an alternative to the capitalist path.

Bourgeois ideology does not overlook the utilisation of nature in the socialist countries, above all in the Soviet Union. The opponents of socialism make a very thorough study of it, draw general conclusions from its particular shortcomings and use these as the basis for spreading the spirit of anti-Sovietism and anti-communism into the sphere of environmental problems too.

These shortcomings, which have as a rule been extensively discussed in the Soviet press and have in many cases already been overcome, enable capitalist propaganda not only to declare that the Soviet Union is misusing nature no less than the capitalist countries, but to go further and proclaim that private property ownership is the defender of nature! For, in the view of capitalist

propagandists, the owner of a plot of land or forest tract cherishes it like the apple of his eye, whereas under socialism it is no man's property. The question as to how the owner of a plot of land will behave if it is to his advantage to sell, fell or burn to the ground his property is, of course, evaded.

But if a private owner cares for his plot and in the socialist countries natural resources are sometimes mismanaged, then there are no grounds, says capitalist propaganda, for thinking that public ownership of all the means of production will to any extent help to protect the environment from pollution. That is to say, something like an "environmental barrier" is raised to social revolution!

Such an approach to questions of the protection of nature permit capitalist propaganda to criticise not only the Soviet state which, it alleges, has the most destructive impact on nature, but also the Soviet world outlook as a whole. Marx, Engels and Lenin, for instance, are rebuked for allegedly having shown little interest in environmental problems. Marshall L. Goldman (*The Spoils of Progress: Environmental Pollution in the Soviet Union*), for instance, claims that Marx only mentioned the matter once, Lenin had even voiced some contempt for environmental protection measures while Engels' penetrating remarks did not save the situation because his remarks were addressed not to a particular entrepreneur but to society as a whole!

And these assertions are made in spite of the fact that the principles on which the organisation of nature protection and the utilisation of nature is based in the Soviet Union are today the solely acceptable ones. It is clear to any environmental specialist that, since nature constitutes a system, the protection and exploitation of nature must be systematic and all-embracing. Private property ownership rules out such a comprehensive

approach, for it is very rarely that the interests of the owners of even two adjacent plots coincide. The utilisation of nature and protection of the environment can be controlled only by a centralised state which has a precise plan for the functioning of social productive forces and can fully co-ordinate their growth. It is no accident that questions of the environment are increasingly becoming the prerogative of governments.

Despite the opinions of the professional capitalist theorists the experience that has been accumulated of harmonious utilisation of nature goes to show that the Earth can be left to our descendants in an improved state only by a social organisation capable of establishing what is truly a system of relations with nature and of controlling the process of social labour, basing itself upon society's real needs and taking the possibilities of nature into account. Such a social organisation must be one that is fundamentally peace-orientated (for nothing is so destructive of nature as war) and which takes full account of the development of society over the years and of the interests of future generations. The proper solution of conflict situations and the normal growth of the "nature" system can be achieved only if society itself also constitutes a single system regulating its own growth in every way. The scientifically grounded management of nature and transformation of it is possible only when there exists a corresponding scientifically grounded management of society.

Therefore some sort of "ecological ideal" may be a society which has attained not only great scientific and technological maturity but also social maturity, which alone opens up the possibility of harmonising man's relations with nature and of establishing them on a scientific, far-sighted and responsible basis. And history has already shown the world such a society, one that has given incontrovertible proof that only under socialism,

under ownership of the means of production and of the land (which is also a universal means of production) by the entire people, and under centralised planning carried out in the interests of the whole of society and on a long-term basis, can an exchange of matter between people and nature be established that would be "adequate to the nature of man". The entire history of the relations between nature and socialism as it actually exists are eloquent proof of this.

It is worthy of notice that capitalist theorists in the sphere of ecology rebuke Marx, Engels and Lenin for allegedly ignoring nature and paying insufficient attention to the interaction of society and the environment. Yet one has only to read Marx' *Capital* to see that, while not making a special study of the question of society's relations with nature, he nevertheless analyses the matter fundamentally. It is precisely Marx who in his *Economic and Philosophic Manuscripts of 1844* was the first to point out that all that was hostile to nature was hostile to man also. Thereby Marx passed judgement on capitalism from ecological positions too: by destroying nature an antagonistic society adopts the role of the enemy of man. While Engels' *Dialectics of Nature* remains to this day an unsurpassed example of a study of the interaction between people and the material world around them.

It is precisely Marxism that performed the historic service of giving consistent and strictly scientific grounds for the unity of nature and society both on the social and historical plane, inasmuch as society is regarded as the highest social form of development of matter itself and human history as the offspring and continuation of nature's history, and on the functional plane, inasmuch as nature is viewed as a "living" system of the circulation of matter, a system which includes human society and which by its laws and functioning determines the possibilities of social progress. "In his practical activity man

is confronted with the objective world, is dependent on it, and determines his activity by it," wrote V. I. Lenin.* Lenin was the first person in history to establish in practice a new utilisation of nature, laying the foundations of a system which many scientists now regard as a model of world utilisation of nature.

It is clear that the critical remarks capitalist "thinkers" address to the classic Marxist-Leninist philosophers on ecological problems are determined once again by ideological considerations. Imperialist ideology has not only to show that capitalism is free of all blame for the aggravation of contradictions between man and nature, but it also has to mould the view that this aggravation largely depends upon the emergence of socialist society in the world. Their appeal to the classics is a long-range shot in the battle of ideas. Their argument is that a society guided in its living practice by a theory whose creators were allegedly indifferent to the fundamental basis of human existence is obviously incapable of organising the normal exchange of matter with nature.

Ideological conclusions of this kind are carefully camouflaged. A seemingly dispassionate study of the organisation of nature protection in the USSR proves upon examination to be a collation of reports of errors and of adverse facts of Soviet utilisation of nature. These facts are usually presented in a one-sided way. When the subject is the excessive felling of timber, for instance, committed by Soviet timber enterprises, figures and percentages are quoted and the age of the forests is mentioned but there is not a word of how the Soviet state is combating such practices and how about 1,300,000 hectares of new state forests are being planted every year. It is noted that several enterprises situated on the Volga lack up-to-date purification installations, but such "trif-

* V.I. Lenin, *Collected Works*, Vol. 38, pp. 187-88.

les" as the simultaneous allocation of hundreds of millions of rubles for building these installations, sums set aside by the decree of the Central Committee of the Communist Party of the Soviet Union and the USSR Council of Ministers "On measures to avert the pollution of the Volga and Ural river basins with unpurified effluent", as well as the direct involvement of twenty-seven regions and five autonomous republics in the implementation of this decree, are not even mentioned. Yet it is precisely such a radical, collectivist and responsible approach to this task which has already produced appreciable results in improving the state of the basins of these two major rivers. Profound regret is expressed at the sudden emergence of erosion in the virgin lands, but the fact is ignored that these eruptions were resolutely stopped and that the state—and only a socialist state could do this!—undertook here unprecedented conservation measures, that a special range of machines was created, the method of tilling the soil was changed and so forth. Only points that can produce the necessary propaganda effect are selected.

The giant machine of capitalist propaganda is widely circulating accusations against socialism among the population of the developing countries. Public opinion in these countries is wrestling with the vitally important issue: along what path should states which have cast off the yoke of colonialism advance? Indifference towards the environment is gradually being overcome, the beauty and variety of wild nature is being recognised as a priceless heritage. Under what social conditions can one best of all preserve the environment and at the same time attain economic independence? The answer to this question today largely predetermines the answer to the previous question. By attempting to discredit socialist utilisation of nature in the eyes of the developing countries, capitalist propaganda is continuing its

long-standing efforts to vilify socialism and communism in general.

The ideological aspects of ecological problems and the way capitalist propaganda hitches onto them represent a new development in the processes of public awareness and in the battle of ideas. It is undoubtedly a temporary development, for socialist utilisation of nature by its advantages itself refutes the inventions of those who oppose socialist ideas.

As the society of the future, communism is legitimately interested in the protection of nature, for it is essentially a matter of safeguarding the natural basis for its flourishing.

Of very great importance is the fact that by dragging the spirit of anti-communism and anti-Sovietism into the sphere of the utilisation of nature, bourgeois ideology is, in essence, coming forward as the opponent of united action by man in relation to the environment he inhabits. In today's conditions, when human activity has assumed global proportions, the utilisation of nature has become in full measure an international affair. Broad public opinion regards the introduction of harmony into this field as a supreme international task. The reduction of international tension and the affirmation of the principles of peaceful coexistence as the norm in relations between countries with different social systems has opened up (one could say, for the first time in history) broad prospects of improving man's interaction with nature.

Addressing the World Peace Congress in Moscow in 1969, Leonid Brezhnev, General Secretary of the Central Committee of the Communist Party of the Soviet Union, emphasised that "peace is not only a question of security. It is also the most important prerequisite for solving the most crucial problems of modern civilisation. And here the very future of humanity is involved—yes, the

future of the entire world...."*

Peace is inseparable from the co-ordinated joint action of people in the utilisation of nature.

*To think of time--of all that retrospection,
To think of today, and the ages continued
henceforward.***

* L.I. Brezhnev, *Following Lenin's Course*, Speeches and Articles (1972-1975), Moscow, 1975, p. 325.

** Walt Whitman, *Leaves of Grass*, p. 341.

III. NATURE AS SEEN BY THE GREAT PHILOSOPHERS OF ANTIQUITY

The Earth's exertion—knocks and shocks and dives
Did in its folly gradually ease.
Man after dark millennia of strife
Was in the Universe's mirror seen.
He was the Master,
Self-proclaimed as such,
Who suddenly stood straight
With head erect—no longer ape.
And Earth now with its flow of days and nights,
Immensely stretching to infinity,
Lay open to his view from East to West,
From deep down in a human
Sovereign brain
First thoughts took their first flight
Beneath the Sun.

Emile Verhaeren

In one of their first joint works Marx and Engels pointed out that man may be differentiated from animals by his consciousness, by religion, by anything you like. The point is when and why does man start to become aware of himself as man. And he begins to distinguish himself from animals as soon as he begins to *produce* the means of subsistence. It is precisely production, labour that distinguishes man from the world of unconscious nature.*

But when applied to man's relations with nature the word "distinguishes" by no means signifies separation. For man, no matter how he becomes aware of himself or exalts himself above the world, always draws the means

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 31.

of his existence from one and the same source—nature. Distinguishing himself from nature he must, consequently, join with it again.

However paradoxical or surprising this may seem, this new link is man's struggle with nature, his object-sensory activity directed towards reworking, changing and adapting the material of nature to meet man's needs. This is man's purposeful activity, his labour. It is precisely labour, raising man above nature, that again unites him with it, realising itself as "a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material reactions between himself and Nature",* it is "an eternal nature-imposed necessity, without which there can be no material exchanges between man and Nature, and therefore no life".**

It is precisely in the process of labour that nature is "humanised" and the full natural richness of man's essence is revealed. This process makes progress only through the agency of people uniting their efforts—through society. That is why only society "is to complete unity of man with nature".***

That is why man's activity to transform nature always has a social character and his manifestations of life, "even if they may not appear in the direct form of *communal* manifestations of life carried out in association with others—are ... an expression and confirmation of *social life*".**** Thus labour figures as the eternal reproduction of social life through the never ceasing transformation of the surrounding world. The contradiction between man and nature is ever removed and ever emerges

* Karl Marx, *Capital*, Vol. I, Moscow, 1975, p. 173.

** Ibid., p. 50.

*** Karl Marx, Frederick Engels, *Collected Works*, Vol. 3, p. 298.

**** Ibid., p. 299.

anew precisely in the process of labour, in which it develops.

It is obvious that labour perceived as a process of the endless reproduction of social life is the entire activity of men, the whole cultural and historical process, human production of human reality. It is the undying flame of life in which both the material world of human culture and man himself are forged.

It follows naturally that there is not and cannot be any "unconscious" human labour. If there were, it would not be human labour. The material aspect of the process of labour proceeds in inseparable unity with its ideal aspect—with the activity of consciousness. Labour consequently embraces both the material and practical relations of people with nature, realised in the process of production, and their consciousness of the material process, of its sources and motive forces, and the working out of new aims and ideas, that is to say, the formation of general notions of the reality which conditions human activity.

Awareness, "the consciousness of labour", which marks any form of human activity, finds its summary expression, so to speak, in man's understanding of the world, in his world outlook. One might say that social man's understanding of the surrounding reality is in accordance with the form and content of his vital activity (not forgetting, of course, that the further man advances along the path of historical progress, the more does his understanding reflect a host of other factors: traditions, religious dogmas, the level of science, natural conditions and so forth and, in turn, to a large degree does it determine the form and content of man's practical and material relations with the surrounding world). Engels noted that man's mastery over nature began with the development of the hand, with labour, as purposeful activity, and widened man's horizon at every new ad-

vance, and that from the very beginning the origin and development of the sciences had been determined by production.*

But what in labour itself is that amazing power which makes people advance along the contradictory path of the ever greater conquest of nature? Wherein lie the sources of the growth of man's might and ... of man's weakness in his relations with the surrounding world?

Those who preach the divine origin of the world claim that "in the beginning was the Word and the Word was with God". As opposed to this with man, as a profoundly earthly being, in the beginning was, undoubtedly, "work". It was precisely "work" that gave rise to both man's speech and his strength. And it is only by examining this "work", by making man's labour in its most general form, as "appropriation of natural substances to human requirements ... independent of every social phase of that existence or rather, ... common to every such phase...", as a process in which "man and his labour on one side, Nature and its materials on the other, sufficed",** only thus can one find the secret of the answer to the question posed above.

The process of labour is the interaction of three "simple" elements: the subject of labour, the object of labour and the instruments of labour. If we consider the subject of labour—man, then it is obvious that *Homo sapiens*—although his brain, his aims and his skill have immeasurably improved—has changed comparatively little throughout the whole of human history: his own physical capacity to have an impact on nature has remained virtually the same as thousands of years ago.

Let us take the second element—the object of labour. The universal object of the labour of mankind is a single

* Frederick Engels, *Dialectics of Nature*, pp. 173, 184.

** Karl Marx, *Capital*, Vol. I, p. 179.

one—nature and its materials. One cannot help observing that nature and its materials, both “raw material” and those already transformed by man, have also not acquired fundamentally new properties as objects of labour.

Touching upon the third element—the instruments of labour—we immediately see that gigantic changes have taken place here, that it is precisely due to the instruments of labour and their progress, that man has been able to increase his strength thousands of times over and to leave such a deep imprint on the face of nature that the mark can disappear only with the disappearance of man himself. The instruments of labour are the measure of man’s might in society’s relations with surrounding nature and are the criterion of historical progress. “It is not the articles made, but how they are made, and by what instruments, that enables us to distinguish different economic epochs,”* said Marx, listing among instruments of labour not only the “bone and muscles of production”—mechanical instruments of labour, machinery and tools, and not only the “vascular system of production”—pipes and various capacities but also production premises, railways and roads, canals, means of communication and the land (as a production site and the bearer of natural properties used in working upon the object of labour), steam, electricity and so forth.

The instruments of labour are the conductor and powerful intensifier of man’s powers which transform the world. Their progress from the first primitive tools given by nature to the extremely complex automatic systems and technical structures of modern times constitutes the growth of society’s influence over its surroundings. The history of the development of instruments of labour is at the same time the history of society’s rela-

* Karl Marx, *Capital*, Vol. I, p. 175.

tions with nature.*

"Nature builds neither machines, nor locomotives, nor railways, nor the electric telegraph, nor self-acting mules and so forth," Marx pointed out. "All these are the products of man's labour, the material of nature turned into organs of the human will, dominating nature, or human activity in nature. They are all *organs of the human brain made by man's hands*, the materialised force of knowledge."** And Marx went on to make his view more precise: "The growth of basic capital is an index of the degree to which *universal social knowledge* (Wissen) [*Italics mine.—I.L.*] has been transformed into a *direct productive force....*"*** The instruments of labour, "the organs of the human brain made by man's hands", are, consequently, the materialised strength of the common knowledge of surrounding reality amassed by man. So one may turn to the history of the development of this knowledge.

And here it becomes clear that in its most general categories it is formulated not by natural science, which constitutes a system of particular sciences, but by philosophy, understood in the Marxist sense as the science of the most general laws of the development of nature,

* Plekhanov, for instance, thought that man's impact upon nature was determined at any given time by the state of his productive forces. The greater these forces, the more productive their operation. (See G. V. Plekhanov, *Works*, Vol. 8, Moscow, 1924, p. 24—in Russian.) This is, in general, an undisputed view. But in this particular case I deliberately bring "the state of the productive forces" to the instruments of labour, as the most dynamic, "leading" component in the whole complexity of man's impact on nature, in order to examine the interaction of the two sides of the contradiction, to take "man and his labour on one side, Nature and its materials on the other" (Karl Marx, *Capital*, Vol. I, p. 179).

** Marx, *Grundrisse der Kritik der politischen Ökonomie (Rohentwurf)* 1857-1858, Berlin, 1953, S. 594.

*** Ibid.

society and thought. It is precisely in philosophy that we find most clearly reflected the basic links of the interdependence between society and nature. This is understandable: the antinomy "man and the world around him" has always been a central issue of philosophy.

Thus most interesting ways of analysing the relations between society and nature present themselves: one may examine the set of philosophical views at a particular stage of human history and relate the changes in these views to the changes in man's practical relations with nature; or one may examine only the practical relations determined by the state of the productive forces and see how changes in these practical relations and in man's daily activities were reflected in his world outlook.

Thus the objectively existing unity of the material-practical and the ideal aspects of labour enables us to trace the whole path of mankind from the savage state, wholly dependent upon nature, to the present state of *Homo sapiens faber*, upon whom the safeguarding of nature largely depends.

Even in the early stages of social progress one may clearly trace the bond between man's practical impact on nature and the various explanations of the surrounding reality which—even when they appear to be totally unsound, when the "savage" has by no means sufficient observations and correct ideas from which to draw conclusions about particular natural phenomena—are by no means sheer invention or the fruit of imagination, but the result of correct thinking on the basis of the only experience and material that could be accumulated in the particular conditions.

What were these "particular conditions" at the dawn of human history? They were, above all, that primitive man had no other way to explain the phenomena occurring around and apart from himself than by comparing them with the phenomena he himself produced. This

was the only path for him, this was his psychological and "scientific" method of explaining external nature.

Undoubtedly such a viewing of nature through oneself and by what one had done oneself was directly determined by the level of development of primitive instruments of labour. Primitive "technology" had not separated man from nature as the object of his labour and as his abode. He transferred to the world only his own properties and qualities (the instruments of labour could as yet be regarded as "given by nature"; they did not have any special properties or qualities differentiating them from primitive nature). Making use of a stick, a stone or a stone blade or axe, man was not yet aware of their specific essence. The savage's "I" is the sole creature he knows best of all and for this reason he proceeds from this, as a known quantity, to all that is unknown. Moreover, the savage's "I" is the only creature about whom one may say the "savage" knows something and of which he actually disposes. Relating nature and the whole of the real world around him only to himself and directly perceiving the environment in which he lives, primitive man legitimately transfers to it his own features, creating an *anthropomorphic* explanation of nature.

The entire history of man's views on nature bears witness to the fact that man immediately "corrects" his views in accordance with any new natural phenomenon he becomes aware of, that is to say, his world outlook changes in one way or another with every new discovery. A historical step of colossal importance—the taming of animals and the utilisation of their strength in the battle with nature—prompts their deification. The forces and phenomena of nature appear in the forms of the creatures with which man links his own existence. Thus in the Vedic hymns, for instance, even the vault of heaven is a boundless cow. All the heavenly phenomena are the children of this black-spotted cow and her impregnator,

the divine bull. In Homer we find sun bulls, in Ovid Zeus himself in the shape of a splendid bull swimming across the sea with Europa. In the Scandinavian epic the cow is the mother of the chief god Odin.... A place of importance is assigned to other useful animals too. Divine horses pull the chariot of the sun and of the victorious Indra; in Hesiod's "Theogony" the divine Pegasus, the son of Aurora and Poseidon, figures; in Russian fairytales horses rescue the heroes from all difficulties. Among the Hindus the ass plays almost a greater part than the horse: he is the knight of heaven, casting his enemies into hell and terrifying all with his braying. He turns to gold everything he eats. In the Vedic hymns Indra is represented as a heroic ram, streaming with ambrosia and trampling a monstrous snake underfoot.

Most of these epics and legends have, of course, come down to us in a much amended form. But one cannot help noticing, firstly, the similarity of the legends of different peoples and, secondly, the fact that the principal characters in them are the animals whom man was able consciously to use and did use in his relations with nature, they are the natural creatures to whom man was able to transfer some of his own functions in labour, whom he placed between himself and nature and with whose strength he equipped himself in the battle with nature. The *zoomorphic* explanation of the surrounding world has its basis, I think, in man's use of animals to sustain his own life. And although there simultaneously existed the worship of beasts of prey, which, I think, is a token of respect for creatures man could not cope with and who surpassed him in strength and sometimes in cunning too, nevertheless the leading position of domestic animals in the host of various "divinities" seems to me indisputable.

Accumulating historical experience, man could not

help becoming aware that nature's "behaviour" was determined by more complex laws than the behaviour of people and animals. He discovered chance, a phenomenon totally incomprehensible and mysterious to him. He gathered that in all nature there is some special and general power, watching every step he takes, sometimes helping him and at other times hindering him. Man gave this power supernatural features, identified it with all nature and at a particular stage of human history arrived at a *pantheistic* explanation of the world. This world outlook was destined to have a long life—some elements of it have survived to this day.

Theist views of nature found unique treatment in the natural philosophy of the ancient Greeks. It was precisely in Greek reality that intellectual activity was for the first time actually distinguished in the sphere of material production. And from that moment onwards ... "consciousness *can* really flatter itself that it is something other than consciousness of existing practice, that it *really* represents something without representing something real; from now on consciousness is in a position to emancipate itself from the world and to proceed to the formation of 'pure' theory, theology, philosophy, morality, etc."* There took place the separation of symbols from phenomena and of notions of things from the things themselves, distinctions were made between the ideal and the material, the subjective and the objective, natural phenomena were differentiated and the transition was made from mythology to a scientific understanding of the world. This was a tremendous leap forward in man's understanding of the world, a leap from myth to logos, as the Soviet scholar F. Kessidi described it and at the same time ... a certain retreat, for the

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 45.

Greeks, having seen "nature in the shape of Venus Anadyomene emerge from the foam of the ocean that gives birth to all things", further developed the anthropomorphism of the ancients.

It was, of course, no longer primitive anthropomorphism. The Greek gods were ennobled, good and handsome. They did not interfere directly in the life of men and in practical affairs. They were busy with their own pursuits, their own games and quarrels. This seemingly unimportant circumstance was of colossal significance for the utilisation of nature. The separation of the gods from the material world evidently enabled the free Greeks to have no fear that, let us say, ill treatment of the soil was an unkindness to Demeter, and it prompted Greeks to think that one could now handle nature without fear of outraging the gods: these latter were "elevated" above the world and no longer watched over it, busy with their own affairs.

It was a unique soaring of human thought! For the first time in history Greek science demonstrated the dependence of the advance of learning and culture not only from the level of development of the productive forces but from their qualitative state. Without slavery there could have been no Greek state, nor could there have been Greek art and science.** And it was precisely slavery which in full measure showed that social injustice towards man inevitably turns to the undermining and destruction of nature. The free citizen of Greece treated the slave as "inhuman", as a base creature, and deeply despised him. Naturally such an attitude would in one way or another be extended to those branches of the ancient economy which required the employment of

* Ludwig Feuerbach, *Das Wesen des Christentums*, Berlin, 1973, S. 208-09.

** Friedrich Engels, *Anti-Dühring*, Moscow, 1978, p. 221.

“unskilled” physical labour, and hence they used the mass of slaves. Such spheres were above all the “service sphere”, stockbreeding and agriculture, that is to say, the sphere of direct utilisation of nature. In other words the burden of social relations transferred to nature oppressed it just as it oppressed people. There arose a kind of double plundering of nature: man, as part of nature, was robbed and nature itself was robbed, as the setting for man’s existence. Not only ancient history but modern history also provides many examples of this.*

As the historically progressive elements of slavery gradually came to exhaust themselves, Greek democracy, science and morality lost their power and came to a dead-end. The “spiritual buoyancy” disappeared and the “unique flower” (Hegel) of the Greek world began to fade. It lost its strength which lay in “the continuity of the universal spirit uninterrupted by particular individuals.... Morals now began to totter ... the reality of morality in the spirit of the people was shaken....** In the person of Socrates science turned away from the world for the first time: the destruction of the “universal spirit” turned the gaze of science away from the reality of society and nature towards logic, abstractions and the construing of an imaginary world.

This found its most interesting expression in Plato’s philosophy. Idealising the slave-owning republic, Plato tried to prove the vitality of a social system that had already outlived its day. He had to declare the whole of the real world to be a phantom and to acknowledge the spiritual world as the only true world as opposed to this world of ours. Plato conceived as a hierarchy not only his state but all natural objects in general; the whole of

* Ibid., pp. 15-17.

** G.W.F. Hegel, *Vorlesungen über die Geschichte der Philosophie*, Erster Band, Leipzig, 1971, S. 593, 599.

creation, corporeality, matter and substance proved in his view to be nothing but the shadows of ideas.

In this connection Plato spiritualises nature in a unique way. In *The Timaeus*, for instance, he remarks: "The composing artificer ... was willing to produce all things as much as possible similar to himself.... Hence, as the result of this reasoning, placing intellect in soul and soul in body he fabricated the universe.... It is necessary to call the world an animal, endowed with intellect."* Many centuries later such a view of nature would be resurrected by scholars of the Renaissance and become a major victory for science, freeing itself from the stifling control of the church.

Aristotle, criticising Plato's views, arrives at God existing outside the world and outside nature, as absolute substance, existing in itself and for itself, something that possesses no materiality. At the same time in the person of Aristotle Greek science attempted a remarkable venture, which was fully realised only many centuries later by Renaissance science. Aristotle advanced from the poetic and contemplative explanation of nature to its scientific explanation in the modern meaning of the word "scientific". For the first time he systematically divided learning into separate branches, he "specialised" science and this, like any specialisation, opened up the possibility of qualitative improvement. The science of antiquity was ready to probe the secrets of nature more deeply and this deeper study already, in fact, began in Aristotle's works.

But at that very moment it was losing its strength, because production was unable to offer it new tasks and aims. "Aristotle," Bertrand Russell rightly notes, "is the last Greek philosopher who faces the world cheerfully;

* Plato, *The Timaeus*, Pantheon Books, New York, 1944, pp. 113, 115.

after him all have, in one form or another, a philosophy of retreat.”* The Hellenistic world seemed to be slowly drifting along with the times until the stern Romans’ cohorts stepped onto Greek soil.

But even after this almost nothing changed either in the science of nature or in the practice of the utilisation of nature. The military empire of the Romans, which prolonged the life of slave-owning social relations for centuries, existed mainly thanks to the seizure of foreign wealth and it was not interested either in the progress of science (with the exception, perhaps, of military science) or in advances in production. Rome gathered the whole of the ancient world into itself as in a knot and, as Herzen put it, imbibed all the sap of the nations it subdued, but was unable to imbibe Greek science, being essentially alien to the enlightened spirit of Greece. “In the impoverished Roman world all that was fair and noble in the individual spirit was rudely erased.” Human thought lost its wings, it could not soar and embrace the surrounding world. “The individuality of nations was crushed; like an abstract generality, alien rule weighed upon the individual ... speculative philosophy could not spring from such death; the latter could produce only good lawyers and the morality of Tacitus.”**

There was no interest here in the Hellenic contemplation of nature, delight in the harmony of the universe or in the “music of the stars”. The destructiveness and immorality observed in public life made people withdraw ever more deeply into themselves, into spirituality, and crushed all interest in the surrounding reality and

* Bertrand Russell, *A History of Western Philosophy*, New York, 1945, p. 232.

** G.W.F. Hegel, *Werke in zwanzig Bänden*, Bd. 19, Frankfurt am Main, 1971, S. 252, 253.

consequently in nature too.*

It would be no exaggeration to say that Roman life fostered and intensified contempt for nature. The notion was gradually formed that nature in itself was of no importance at all. And Hegel, analysing this period, summed up its attitude to nature as follows: "Now there no longer existed that state of affairs which people call man's life in unity with nature, a state in which man sees god in nature, because he finds his satisfaction in nature."**

At the basis of the developments we have referred to lie changes occurring in production. Roman militarism, the barbarian invasions, which destroyed the economy of a slave-owning society, the decay of the ruling class, the exhaustion of natural resources and of the land and forests, which had already been observed in several ancient metropolitan countries, heralded the fact that slavery was coming to an end—the productive forces

* It is no accident that only Stoicism fully developed on Roman soil. And although at the same time in Epicureanism a last, purely Greek, attempt was made "brightly and in some regards cheaply", as Herzen vividly put it, to reconcile thought with life and oneself with one's surroundings, it was only the obverse of Stoicism. "Both schools of thought attach incomparably more importance to the human individual than any of the preceding philosophical doctrines; we are on the threshold of a recognition of the boundlessness of the human spirit." (See A.I. Herzen, *Letters on the Study of Nature*, Moscow, 1946, p. 164—in Russian). Neither the Stoics nor Epicurus offered original explanations of nature. The Stoics' universe was based on a rational world spirit which they called god. Their philosophy of nature was, accordingly, pantheism. (See G.W.F. Hegel, *Werke*, Bd. 19, S. 262). The Epicurean philosophy of nature was based upon a rejection of teleological notions of the wisdom of the demiurge which manifested itself in the universe, and of his aims. But Epicurus offers no explanations of his own about the universe, confining himself to explaining particular aspects of it and separate phenomena.

** G.W.F. Hegel, *Werke*, Bd. 19, S. 417.

were being deprived of their capacity for qualitative improvement. The ancient city gradually retreated to the background, losing its significance as a centre of production and of public life. With the extension of the territories man brought under his control, the Mediterranean cities and Rome lost, due to undeveloped communications, their importance as trading centres; one may say that the greater the Roman Empire became, the worse things became for Rome itself. The opposition of town and country was at this stage to be resolved in favour of the countryside, because economically the countryside had almost no links with the towns, but the towns could not as yet exist without the countryside. Referring to Rome, Marx and Engels said that it "never became more than a city; its connection with the provinces was almost exclusively political and could, therefore, easily be broken again by political events".* The ancient towns were no longer able to retain the lead in social progress and never regained it.

The period of the decline of the Roman Empire was at the same time a period when a new mode of production—feudalism—was being established. The fairly well-marked division of labour in slave-owning society, expressed in the opposition of town and country, now grew less important. "In agriculture, it was rendered difficult by the strip-system, beside which the cottage industry of the peasants themselves emerged. In industry, in the individual trades themselves, there was no division of labour at all and very little between them."** Such a state of the productive forces, of exchange and labour was essentially a step backward in

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 84.

** Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 35.

society's relations with nature. One may say that feudalism, being the heir to slavery in historical time, was the heir of the communal tribe formation in its dominant form of relations with nature.

Philosophy recorded traces of this "double" mode of production in a "twofold" way too—in neo-Platonism, a strangely eclectic combination of ancient thought with the thought of the Christian world. Neo-Platonism tries, as it were, to return to the sources—to early Greek theist notions, it worships the various forces of nature, presents them in human form and at the same time limits "...moments of world progress to phases of the unconditional spirit that is incorporeal, immanent in the world and self-contained".* It tries to continue paganism, to give a rational explanation of it and at the same time to accept the Stoic doctrine of the identity of the world's beginning (fire) with man's inner "ego". It tries to start out from the immediate perception of the world and nature, but it explains this world by the supernatural and so forth.

Its desperate striving to reconcile the irreconcilable, to retain the support of a reality that is slipping from under the feet is very striking testimony to its ever increasing divorce from life. The thought of antiquity had already deeply probed the phenomena of the surrounding world, but practice was following a new path—that of extensive, spatial, "latitudinal" conquest of the planet. It fell to the entire Middle Ages to mark this tragic divorce between theory and reality.

Majestic in their hopelessness and persistence were the efforts of the neo-Platonists to adapt the great philosophy they had inherited from antiquity to the level of development of the new basis and to the character of the new world. But their path was predetermined. "The

* A.I. Herzen, *Letters on the Study of Nature*, p. 172.

universal viewpoint of neo-Platonic or Alexandrian philosophy lies ... in that it gives birth to a world from the loss of a world"*—that is how Hegel describes the inescapable result of their efforts. Convinced that they were raising a giant, they were bringing up a dwarf. They wished to give the world a Narcissus, but they brought forth a monster which came to be known in history as scholasticism.

Scholasticism, in which nature no longer had any place at all, supplanted science up to about the sixteenth and seventeenth centuries. It was "neither fully religious nor fully scientific; from the precariousness of its faith it sought syllogisms, from the precariousness of its logic it sought faith; it submitted its dogma to the most punctilious ratiocination and its ratiocinations to the most literal acceptance of dogma.... There was no question of natural science: scholasticism despised nature so much it could not study it ... nature took no part in the schoolmen's endless arguments ... they regarded nature as a lowly serf, ready to fulfil the arbitrary wishes of man, to abet all base impulses and tear one away from the higher life, and at the same time they were afraid of its secret demoniacal influence, confident that the whole universe had a personal relationship with every man—a hostile or peaceable relationship.... Learned studies at that time had a purely bookish character which they had not had in the ancient world: whoever sought learning, opened a book and turned away from life and nature."**

In the shape of scholasticism philosophy emerged as a zealous and devoted handmaid of theology—even secular authority it regarded as subordinate to the spiritual authority of the Church. All the intellectual energy of the schoolmen was spent on proving utterly irrational

* G.W.F. Hegel, *Werke*, Bd. 19, S. 412-13.

** A.I. Herzen, *Letters on the Study of Nature*, pp. 202, 205.

and mystical truths—God's creation of the world from "void", the combination of man's freedom of action towards nature with God's concern for man's destiny and so forth. Only in this light, evidently, does not only the humorous but also the formal aspect of an episode in the lives of Alexandre Dumas' well-known musketeers become clear. In the presence of d'Artagnan a Jesuit, a curé and Aramis discuss in all seriousness what subject they should choose for a dissertation: "A low-ranking officer of the church should use both hands for blessing" or "A certain regret befits a person offering a sacrifice to God". The first subject proves to be "dogmatic and didactic", the second—almost heretical. And it was upon this that scholarship threw itself, it was to this that scientific thought was directed. Divorced from the world of nature learning inevitably came to a dead end, lost the stimulus for development and compromised itself.

In scholastic notions of the world man was divided into his mortal body and immortal soul. His activities were regarded as, on the one hand, wholly and completely dependent upon God and, on the other, wholly and completely independent of nature. And indeed what influence could the nature constructed by the schoolmen have upon man! In the most universal and influential system of scholastic philosophy, that of Thomas Aquinas, nature is presented to us as a hierarchy of dead forms, once created by God and since then remaining unaltered until "the end of time" or "Judgement Day". The worlds of minerals, plants, animals and man are absolutely isolated from each other and have no links between them whatsoever.

Striving to direct all the people's thoughts to God, the church and scholasticism, which served it, shunned nature in every way, presenting it as forbidden fruit, incomprehensible and useless to man. Indeed both in grasping the truth and in erring, too, the mind of man

knows no bounds!

Why did the Middle Ages have so little need to study nature? Above all because production practice in the towns, not to speak of the countryside, was exclusively artisan, based on the training of many generations of workmen, on the handing down of empirical skills from father to son, from master to apprentice. An elementary stagnation of industrial production was to be observed. The low level of demand made it possible to get by with such "industry", although shortages also forced noble knights to strip their vanquished foes of their bloody and battered suits of armour and to collect the nails and spoons from castles they captured. One must also take note of the possibilities that then existed for extensive development of production in the feudal age—the great free expanses of our planet, the redistribution of lands between states by means of war, and the smaller size of the population. Of no little importance, evidently, was the further fact that the principal and virtually the sole direction of this production was agriculture. And, as is well known, farming has to "co-ordinate" its cycles with limits imposed by nature for repeating the production process.* These bounds set by nature make it possible to develop production only horizontally, always in one and the same rhythm, to a certain extent conditioning a corresponding view of the world and of nature as something one-dimensional and immutable.

The static world of the Middle Ages ascribed its own static character to the whole universe. Its cosmology was based on the geocentric system of Ptolemy. The church, it is well known, so zealously defended this system that only death saved Copernicus from the Inquisition. "This fool wishes to reverse the entire science of astro-

* K. Marx, *Grundrisse der Kritik der politischen Ökonomie (Rohentwurf)* 1857-1858, S. 443.

mony,' Luther said of Copernicus, 'but sacred Scripture tells us that Joshua commanded the sun to stand still, and not the earth'."* In those days such a reference to a "prime source" was sufficient to prove the guilt of the freethinker.

*The bishops judged complaint a crime;
Their Gothic battlements bit air
And for their fiefs alone they cared
And traced their line to ancient time.***

To the schoolmen the universe was not only immutable but was also finite in space and unknowable. And no few attacks were beaten off by these extremely reactionary, petrified notions. Giordano Bruno had to come, to sweep like a whirlwind across almost the whole of Europe and, after eight years in prison, to burn at the stake, for doubt to be cast upon the schoolmen's agnostic views.

It would be wrong, however, to conclude that the whole of medieval science spurned nature and lost the capacity to advance. Human thought, cramped in the poverty of scholasticism and theology, rushed headlong into the sphere of practical science. Having no possibility of undertaking a comprehensive assault upon the problems of nature and society, the science of this period made an immense contribution to the development of applied branches of learning—many specific achievements in mathematics, astronomy, mechanics and physiology were to the credit of medieval thinkers. Knowledge of nature was slowly but steadily accumulated and a turning-point in productive forces and in the outlook of mankind was approaching.

* Bertrand Russell, *A History of Western Philosophy*, p. 528.

** Emile Verhaeren, *Poèmes*, Paris, 1917, p. 100.

*Thus, in the course of dark or torch-lit years,
Man his own body made, his speech and brain,
And his abode by fields and river banks,
To feed there on the Earth's most gracious fruits.
There he first came to sense a brutal pride;
He set the banners of his strength upon
The threshold of life's palace wild and red;
At times he felt the fate of nations lay
Within the grip of his inspired hands
And made himself king, tribune, warrior, sage,
And fortune fully aimed sprang from his head.
Soon afterwards the age of conquests came
And soaring wisdom into heaven pried,
Art sprang as bright as flowers in the morning,
And marble and inscriptions thought became.
It was strength joyful after strength in mourning,
Both beautiful because they are the pride,
The flame and splendour of life set ablaze.**

* Emile Verhaeren, *Le multiple splendeur*, Paris, 1922, pp. 37-38.

IV. THE RENAISSANCE AND THE NEW VIEW OF NATURE

The human understanding is active and cannot halt or rest, but even, though without effect, still presses forward.

Francis Bacon

It circulates around the Earth beset
Deep in the nights and at the heart of days
Forever,
The great storm of rising thoughts....

Emile Verhaeren

The greatest historical paradox of this time was that the Church itself, while on the whole ruthlessly suppressing all live thought, was interested in the advance of the applied sciences. For instance, the Church at first welcomed Nicolaus Copernicus' book: the tables he had compiled made it possible to calculate the motion of heavenly bodies correctly and to make the calendar more accurate, which was of primary importance for the observance of religious festivals. But the main thing was that the Church was a major landowner, merchant and builder. The architectural masterpieces of the Middle Ages could not have been built "by a divine sanction" alone. The magnificent cathedrals and palaces called for the development of mathematics, geometry and physics. The fight against sickness was also conducted not just by prayer. The result was the formation of new social groups and of a new outlook. The physician became a customary figure in medieval castles, towns and even monasteries. The workshops that steadily expanded

produced not only goods in wide demand but also within their walls there was born a new class—the class of workers. The growth of commerce brought a growth in the number of people engaged in trade. Labour was becoming a collective undertaking. The horizon of a considerable part of the population widened, the viruses of disbelief and doubt spread among the masses like an epidemic.

The church was also let down by the scientists whom it supported and upon whom it placed reliance. The alchemists turned out to be chemists, the astrologers—astronomers, while the theologians put forward revolutionary philosophical ideas.*

Retreating in face of the pressure of the times and of scientific discoveries, the Catholic church invented a curious defence weapon—the conception of “two truths”. The essence of it was, while not forbidding scientific quests and not rejecting the fruit of the tree of science, to cultivate this tree in an orchard hidden from the sight of the masses. On no account should the revolutionising ideas of science be spread beyond a narrow circle of scientists, clerics and the ruling elite. This circle of the elect knew very well how to manipulate both old and new. Even Pope Leo X had to acknowledge the advantage of the legend about Christ. It was precisely for their “advantageousness” that the old tales were kept

* Paracelsus, for instance, a remarkable physician and one of the first exponents of experimental knowledge, was a theologian, astrologer and alchemist. To this day cardan joints render reliable service, reminding us of the man who compiled a horoscope of Jesus Christ—Girolamo Cardano. A mathematician and the author of formulas for solving cubic equations, the person who introduced imaginary quantities into the arsenal of mathematics, he was an astrologer, as was Johann Kepler, the great astronomer who established the fundamental laws of the motion of the planets. Nicholas of Cusa, scientist and philosopher, was a theologian.

and science was held on a tight rein.

But science is not a steed that for long suffers a bridle and rider. Nourished by the living juices of practice, it could not help but gather new strength and break out into the broad field of research. The historic landmark was approaching beyond which mankind was to become aware of its world in a new way and to act upon it in a new way. The sails had already been raised on the masts of the ships of Magellan and Amerigo Vespucci. The overshot waterwheel had been invented, the blast-furnace metallurgical process had been discovered and the first shots of gunpowder were already disturbing the silence of our planet.

Science was in the crest of a new historical wave. Scientists, who still considered themselves astrologers and theologians, by their own activities were already lighting the dawn of the Renaissance over our planet. They were summing up, as it were, the quests of the suffering thought of the Middle Ages, and this summing up was the first step into the bright world of the Renaissance. Science was assuming its time-honoured role as the enemy of all blind faith. As Engels said, men were born who were giants in power of thought, passion and character.* Under these circumstances the view of nature necessarily changed and a new world outlook consonant with the age was evolved. The hearts of seekers after truth beat ever more loudly and boldly under many monastic robes.

"At that time natural science also developed in the midst of the general revolution and was itself thoroughly revolutionary,"** Engels was to write about this period. For the first time the Earth was really discovered and its true boundaries realised. The founda-

* Frederick Engels, *Dialectics of Nature*, p. 21.

** Ibid., p. 22.

tions were laid of world trade and machine production, which gave a new impulse to the advance of the natural sciences. And generalising philosophical views necessarily came in the wake of the accumulation of knowledge.

The sources of the new view of nature and of the new world outlook may be traced to Nicholas of Cusa. This official of the Catholic church was an extremely erudite person and a born scientist. He was the first to compile a map of Central and Eastern Europe and he proposed introducing the new Gregorian calendar in place of the outdated Julian one. He made a serious study of mathematics and of natural phenomena.

But the main thing was that Nicholas of Cusa, while recognising only God as the supreme being, was nevertheless able to deprive God of the most important attributes he had "won" during the medieval period. He revived the Greek idea of the infinity of the world, of the absence in it of any centre and of the interlinking of natural phenomena. Nature became knowable and the process of knowledge—infinite. And although he skillfully demonstrated his profound belief in God and his devotion to the church, his writings were a meteorite tearing into the stagnant waters of medieval social thought.

But a really powerful blow at theological explanations of the universe was dealt by Nicolaus Copernicus. Moreover, whereas the conclusions of Nicholas of Cusa were mainly theoretical ones, Copernicus made a discovery of a practical nature. And it was precisely from the time of his discovery that "the emancipation of natural science from theology dates".*

Copernicus' heliocentric system reduced the Earth in rank from the centre of creation to a "rank-and-file" planet. The pedestal upon which theological theories had

* Frederick Engels, *Dialectics of Nature*, p. 22.

been piled up, collapsed. The conclusions of the canon of Frombork, seeming to contradict what could be directly observed but confirmed by the iron logic of mathematical proofs, were a convincing triumph of the power of human reason and opened up enormous vistas before the theory of knowledge. Copernicus himself did not construct philosophical systems, but his astronomical discovery became the unshakable foundation of such systems.

In philosophy, as in everything else, Leonardo da Vinci was centuries ahead of his time. The artist, the poet and the engineer of genius have overshadowed the philosopher in Leonardo, and his view of the world, like much of what he accomplished, remained unknown for too long. But it is now obvious that Leonardo was the forerunner of the modern philosophy of the natural sciences, who proclaimed and in his own practical work confirmed the enormous role of experiment. He was the first scientist of his time to reject the teleological principle ascribed to nature and to formulate the principle of determinism and causality. His all-embracing gaze deeply probed the secrets of the world and Leonardo was the first to write of the natural necessity that penetrated nature, lives in nature and is the law of nature. And very close to this observation is the thought that knowledge of this law makes man the master of nature. And Leonardo himself in all his activity seemed to strive to affirm this idea—however fantastic his ideas might seem at first sight they were always directed to practical use and to the practical mastery of nature.

The hour of the open rebellion of science against religion was announced by the appearance of Giordano Bruno, that inflexible fighter for the new learning. It was only Bruno who helped the church and European social science to realise the tremendous explosive force of the calculations of Copernicus. With a determination

that even today seems desperate Bruno routed the old view of the world and developed and popularised the ideas of Copernicus. He affirmed not simply the infinity of the universe, but also the infinity of the worlds existing in it. He corrected the errors of Copernicus, who thought the Sun to be the centre of the world, and he showed that there was no such centre at all. He declared the stars to be suns! He foretold the existence of planets round these stars. He also expressed the view that the universe had never been created by anybody, but had always existed.

Nothing could now hold back the triumphant progress of the new ideas. The Renaissance knew hardly any "pure" philosophers—most of them were major mathematicians, physicists and chemists. While still unable completely to renounce the idea of the divine creation of the world, they could no longer ignore the thrilling results they had obtained in their laboratories. But they found an original solution by linking God and nature in one. They insured, as it were, their own results in the natural sciences by the presence of God, they gave advance warning that there was nothing unnatural or devilish in them. They revived—at a new level, of course—Greek polytheism and natural philosophy, thereby opening the way to a deep knowledge and conquest of nature. Many false fruit, of course, were attached to the luxuriantly spreading tree of Renaissance science. The dominance of mysticism and astrology was by no means immediately overcome. Nature was often treated analogously with man—an anthropomorphic, organismic world outlook was revived. There were quite a few supporters of hylozoism—a conglomeration of views about the general animation of nature. The "world soul" and "world intelligence" made people regard matter as only a passive and inert substance. But ever more luxuriantly rose the crown of the mighty tree and

gradually those shoots gained strength from which materialist conceptions were to unfold. And new gardeners were already hastening towards this splendid tree.

With a firm and careful hand Galileo Galilei straightened its branches. His telescope became a weapon in defence of the dead Copernicus and the burnt Bruno and uncompromisingly affirmed that they had been right. For the first time the human eye saw the mountains and valleys of the Moon, saw the satellites of Jupiter, the phases of Venus and spots on the Sun. The mechanics of the stellar bodies came under direct observation.

Studying the heavens, calculating the paths of planets, suffering from other people's envy and lack of understanding, renouncing his own views, Galileo was unable to renounce the truth contained in nature. He worked out the principles of the scientific study of nature, he demonstrated the decisive role of quantitative analysis and virtually formulated the basic task of human knowledge: through study of the facts and phenomena of the material world around us to reveal its secrets. He proclaimed the possibility of unbounded knowledge of nature and for the first time realised that knowledge of the truth was not a state but a never-ending process.

Yet the colossal stride Galileo took did not free him from certain notions of the world which his own contemporaries even had rejected. He did not accept the advanced views of matter held by natural philosophy and he regarded matter only as particles of substance without qualitative features. Galileo's matter is dead matter and the objects of his world consist of these dead bricks laid in corresponding forms. Mechanistic materialism is the principal feature of Galileo's world outlook.

Copernicus, Bruno, Nicholas of Cusa, Montaigne, Picot, Paracelsus, Cardano, Campanella, Kepler, Leonar-

do and Galileo—each of these names is for us today a synonym for the heroic efforts of human thought to grasp the world which manifests itself to us in innumerable ways. Starting from an unconditional recognition of nature as God's creation, Renaissance science gradually arrived at the simple truth for which, however, many of its leaders had to experience the bitterness of exile and some had to sacrifice their lives: the laws controlling nature are its internal laws. And, while not yet fully renouncing God, they subordinated God also to these laws and dissolved him in nature.

The quests of the outstanding scientists of the Renaissance, most of whom were Italians, in the latter period of this era were further pursued in England. They were taken up by a person whom Marx called the father of English materialism and of all modern experimental science. England was taking the lead in scientific and technological progress. Young English capitalism was straightening its shoulders much more swiftly than French, Italian, Dutch or German capitalism. It had a vital need of science. Marx was referring to Francis Bacon. Bacon bitterly criticised scholasticism for making science the handmaid of religion. But he himself was one of the first to harness science to the yoke of capitalism.

Ideas which had sparkled in his predecessors like small grains shone in Bacon like huge diamonds. The appeal to nature, the striving to probe it and know it was for Bacon an unquestionable law. "Man, as the minister and interpreter of nature, does and understands as much as his observations on the order of nature, either with regard to things or the mind, permit him, and neither knows nor is capable of more"*—this was Bacon's credo. In his view matter really "seems to attract man's whole

* Francis Bacon, *Advancement of Learning*, London-New York, 1900, p. 315.

entity by winning smiles".*

Perceiving nature in its full reality, Bacon chose a method of study that was also profoundly realistic. His Majesty Experiment—this was the main tool and guide of the English scientist along the path of knowledge. "We are founding a real model of the world in the understanding, such as it is found to be, not such as man's reason has distorted. Now this cannot be done without dissecting and anatomising the world most diligently; but we declare it necessary to destroy completely the vain little, and as it were, apish imitations of the world, which have been formed in various systems of philosophy by men's fancies,"** Bacon said.

His materialism contained within itself in a naive form embryos of all-round advance. But not many of these embryos were destined to peck their way through the shell of one-sidedness and traditional notions. Somehow the quest he had unfolded abated of itself upon Bacon's death and his materialism was truncated and formalised. Thomas Hobbes, the systematiser of Bacon's materialism, continued Bacon's line but it is precisely in Hobbes that knowledge "based upon the senses loses its poetic blossom, it passes into the abstract experience of the geometrician. Physical motion is sacrificed to mechanical or mathematical motion; geometry is proclaimed as the queen of sciences. Materialism takes to misanthropy."***

The impoverishment and mortification of nature, its reduction to geometrical and mechanical laws meant that man himself was also impoverished, was also regarded as a mechanism and was restricted by the same laws.

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 4, Moscow, 1976, p. 128.

** Francis Bacon, *Advancement of Learning*, p. 363.

*** Karl Marx, Frederick Engels, *Collected Works*, Vol. 4, p. 128.

"If it is to overcome its opponent, *misanthropic, fleshless* spiritualism and that on the latter's ground, materialism has to chastise its own flesh...."* Here materialism is "working" for idealism: reducing nature to a totality of extended bodies differentiated by magnitude, configuration, situation and motion, that is to say, reducing the world to a system of measurements and mechanical laws, materialism, inevitably had to counterpose to nature the variegated richness of human sensibility as some kind of "subjectivity". It is only one step from such counterposing to a world that "does not exist apart from man" and to "pure" idealism.

In other words, man having just managed to restore nature to himself in its full living and multiform beauty and significance, again hastens to renounce it and again determines for himself a kind of narrow, one-sided, mechanistic view of the world. Freed from the yoke of theology, philosophy falls under the yoke of mechanics. The development of the natural sciences, the ever increasing knowledge of the secrets of nature and the now obvious power of the strict formalism of mathematical and mechanical laws force philosophy to put forward the thesis that "the laws of mechanics may be accepted as laws of nature too".

This standpoint was most clearly expressed by René Descartes. A major physicist, mathematician, one of the creators of analytical geometry and modern algebra, an optician, physiologist and philosopher, Descartes was convinced that the only difference between man-made machines and the various bodies made by nature was that "the effects of machines depend for the most part on the agency of certain instruments, which, as they must bear some proportion to the hands of those who make them, are always so large that their figures and

* Ibid.

motions can be seen; in place of which, the effects of natural bodies almost always depend upon certain organs so minute as to escape our senses".*

Man himself, according to Descartes, was a soulless and lifeless corporeal mechanism directed by the soul which alone was endowed with intelligence and will, and this view was expressed in his famous dictum: *Cogito, ergo sum*—I think, therefore I am. The seed was sown of the metaphysical counterposing of the thinking being to nature, of the independence of man from the world around him.

It is important to stress that both Bacon and Descartes—outstanding thinkers who were able to sum up, as it were, the process of the formation of views on nature during the Renaissance—went further than their predecessors in the purposeful orientation of science. They firmly proclaimed the incontestable power of knowledge and its main aim—the conquest of nature, mastery of its forces and its transformation.

It is hardly possible to give a simple answer to the question whether this was an expression of the self-assurance of science that was now gaining momentum, or a manifestation of man's ancient fear of nature, or the belief, fostered by the achievements of reason, that man could order everything in the best possible way and correct the "Creator" in whom he had until recently had unbounded faith. But I think it is indisputable that their views reflected the thirst of young capitalism.

The time had come when any confines became a hindrance, a time of the eager hastening of a society for which growth was an end in itself, and for the sake of this growth arbitrary violence was being planned and was already being committed with regard to both man and

* René Descartes, *The Method, Meditations and Philosophy*, London, 1901, p. 358.

nature. Marx pointed out that "production, based on capital ... creates a system of universal exploitation of natural and human properties.... Nature becomes merely an object for man, merely a useful thing.... Capital sweeps away national limitations and national prejudices, the deification of nature, the traditional, smugly contained satisfaction of existing needs and the perpetuation of the old way of life. Capital is destructive of all this...."* The theoretical alienation from nature, which marked the Middle Ages, was mainly outlived by the science of the Renaissance, but as if in order to be replaced by practical alienation. And it is precisely this practical alienation which appears in the light of modern knowledge to be the principal source of the ecological problems which cause the world anxiety. But the change that had been made was bound up with the most splendid dreams and hopes that:

*The more precise and clear the men of thought shall be
The more they shall be proud, their soul be pleased
They are the lofty workmen of life,
The more they'll turn toward themselves that spark
Of insight which with new flame fires the mind,
The more their steps shall ring on triumph's road
And they'll admire themselves, being indeed
What lives aloft beneath the ancient skies,
The more to the horizons there on high
They'll spread—the ample, fertile, great ideas.***

* K. Marx, *Grundrisse der Kritik der politischen Ökonomie*. (Rohentwurf) 1857-1858, S. 313.

** Emile Verhaeren *Le multiple splendeur*, p. 163.

V. THE APOTHEOSIS OF PROFIT AND THE FLOUNDERINGS OF THEORY

These European heroes armed with clear resolve,
Active in triumph, clever in defeat,
With dominating brains of crime and grave offence
And hands that cling to hope with force unanimous...
They would forget themselves in their fruit-

bearing task
Were it not that in thick mists of the North
In Glasgow, Antwerp, Frankfurt, too, the banks
Keep constant watch with eyes where gold and

fever glow
For signs they make in searching all across the

globe.
The Earth so rich, immense and prodigal, the Earth
Alive belongs to him who keeps it best in check
And breaks it in by efforts crowned in victory,
Like a young steaming horse that rears up in the
light.

Emile Verhaeren

The bicentenary celebrations of the United States of America were, one might say, a celebration of world capitalism. The main idea was to show what a "society of free enterprise" could achieve. Money and smiles were lavished on this worthy aim.

America undoubtedly has good things to show the world. The brain and brawn of its workers have created and are creating enormous wealth, very big cities, modern technology, splendid roads, magnificent shops and much else. Capitalism made deliberate use of all this during the US bicentenary in order to show what it could do.

But amid the sound of official speeches and polite applause and of numerous jubilee events there suddenly

emerged another unplanned aspect of the advertisement for capitalism: in showing what it could do, capitalism at the same time showed what it could not do. The land that met the Pilgrim Fathers arriving on board the *Mayflower* and the land of America today are totally different things. Capitalism has proved incapable of preserving and even more so of improving the basis of the existence of human society, that is to say, the land. The destruction of this basis—that is the price of the successes which were demonstrated at the celebrations. The Middle Ages regarded nature as a “lowly serf”, and it is precisely from the example of the United States that one can see how capitalism has implemented the ideas of the world bequeathed to it by the preceding social formation: it has indeed turned nature into a serf. The most highly advanced and powerful capitalist country has provided the most striking examples of the rapacious utilisation of nature.

Capitalism built powerful industries which opened up before man the possibility of implementing the aspirations of Bacon and Descartes for the reshaping and conquest of nature. But whereas the scientists’ aspirations were justified by their desire to find the truth and to benefit mankind, whereas they expressed the triumph of the infant who has appreciated the strength of his reason, the aspirations of capitalism were determined by something quite different. The demons in control of society—commercialism and money-making, narrow practicality, the spirit of gain—gave rise to the crude spoliation of nature, that was at times quite senseless and immeasurably cruel. And that is quite understandable. In a society of general alienation, where man is set against man as one rival to another, he is in exactly the same opposition to nature.

It is true that there is something common between capitalism and slavery in their counterposing of nature

and man, in their cultivation of a soulless, callous attitude to the surrounding world. The extent and the scale of this phenomenon cannot be compared, of course. Slavery placed man in the position of a live automaton, but did not have the same view of nature. Lack of concern for nature arose as a kind of secondary effect, as a result of scorn and lack of concern for the slave. The view of capitalism is incomparably broader. Although for the bourgeois too, as Engels said, the worker was not fully a human being, he was nevertheless no longer an article of property, becoming a source of labour power. Such a source may be used according to one's requirements without being concerned about him for the remainder of the time. Greater attention is paid to nature, but only as a source of enrichment, as a source of raw material which must be taken as quickly and as cheaply as possible. The system of "squeezing out sweat" is applied to man, and to nature the system of "squeezing out resources". Just as a man is discarded from the system of production if he fails to satisfy his master in any way, so a particular natural resource is at once dropped in favour of another resource which can be exploited to greater profit. The competition of people is supplemented by the competition of resources.

How then did the practices of young American capitalism appear in actual fact? What was the spirit that swept two hundred years ago over the North American prairies, over its rivers and forests, the Rocky Mountains and the Cordilleras?

"Westward expansion of our young, vigorous nation brought with it a waste of natural wealth no less stupendous than the historic movement itself," the American researcher R. Parson was to write of that period, asking: "Who will assert that our pioneers were truly wasteful, that they should have bridled their greed, spared the means to quick riches—and postponed our

rise to national greatness? ”*

I think that even if we agree that the upsurge of a nation is secured by the swift enrichment and greed for profit of particular individuals, later generations might view the actions of the pioneers differently. By the way R.Parson himself in his excellent book gives the pioneers what sounds more like statutory praise. Admitting that it was “most fortunate” that the pioneers could live “off the land”, he notes: “It is tragic that they unwittingly instituted a ‘scorched earth policy’. Quite innocently and to good purpose they initiated many of the problems we are here concerned with solving, but some things that they had in untold numbers have now vanished from the land.”**

This remark is essentially inaccurate. The people settling North America were not acting “quite innocently”. The assault on nature that began in Plymouth Bay continued throughout the country. And it was not even an assault but a destruction of all they met on their way. The lone hunters, squatters and small groups of lumbermen rapidly became a thing of the past. Organised business came to the fore in the utilisation of nature and the attack on nature assumed a total character. The trappers collected hides more rapidly than the wild animals multiplied, centuries-old trees were uprooted by dynamite—felling was expensive and took too long; the land was exploited to the point of exhaustion—the rapacious grazing of cattle in alpine meadows turned them to desert; the very rich forests gave way to ploughland which was rapidly exhausted, and our bold pioneer, “skimming the cream” from the land, set off for new places. Ernest Hemingway once

* R. Parson, *Conserving American Resources*. Englewood Cliffs, 1956, pp. 21-22.

** Ibid., p. 307.

said that continents rapidly waste away with the coming of white people. This applies above all to North America.

It was as if a wave of malice and greed had borne down upon one of the most beautiful continents on Earth. In was not, of course, without importance that the Anglo-Saxons, Spaniards, Dutch and French had come to a foreign land—North America, as is well known, was the homeland of another people. The natural landscape of America seemed to them wild, “full of wild beasts and wild men”, and “which way so ever they turned their eyes they could have little solace or content in respect of any outward objects”.*

In a strange, somehow “upside-down” way the situation again reminds us of the times of classic slave-owning society: the American colonists were as indifferent and even hostile to its natural landscape as the slave of antiquity was indifferent and hostile to the land of his masters. No doubt it could not be otherwise; for the white folk came to the American continent as conquerors. War could not but begin, and it began. Its victims were the wildlife and the forests, the birds and rivers, the fish and soil, the Earth’s bowels and people.

*The red aborigines,
Leaving natural breaths, sounds of rain and winds,
calls as of birds
and animals in the woods, syllabled to us for names ,
Okonee, Koosa, Ottawa, Monongahela, Sauk, Natchez,
Chattahoochee, Kaqueta, Oronoco,*

* William O. Douglas, *The Three Hundred Year War*, New York, 1972, p. 196.

*Wabash, Miami, Saginaw, Chippewa, Oshkosh,
Walla-Walla,
Leaving such to the States they melt, they depart,
charging the water
and the land with names.**

These powerful and beautiful lines of Walt Whitman ring like a requiem to the Indian tribes. They have left their names and departed.... But why have they gone? How was this "departure" of entire peoples accomplished?

Nobody set out to insult the Europeans who arrived in America. The Indians living on the coast helped them with food. The pilgrims landed on the coast in the autumn of 1620 and would hardly have survived the winter without the generous help of the Indians. The Indians taught the foreigners to grow maize, tomatoes, pumpkins and other produce still unknown in Europe. These crops, taken over from the Indians, at the present time constitute four-sevenths of the farm produce of the United States.

The settlers took over from the Indians their way of clearing the land of trees. From the Indians they also learned how to make forest paths, how to build boats—canoes—and handle them. The well-disposed Indians showed the traders and settlers the way across the Appalachians and thereby opened up to them the whole continent.

The whites settled accounts in full with the trusting aborigines. At first they supplied them with firearms and set one tribe against another. Then the British and French used them as armed auxiliaries in their own dispute. Then the whites ruined the economic life of local tribes with the aid of manufactured goods and

* Walt Whitman, *Leaves of Grass*, p. 22.

mainly rum. Then they began gradually to seize the forests and lands belonging to the Indians, and proceeded to the direct extermination of the latter.

The naiveté of asking whether American capitalism took care of environment in those stormy years will become quite obvious if we recall that at that time not only animals but people too were hunted. "Those sober virtuosi of Protestantism, the Puritans of New England, in 1703, by decrees of their assembly set a premium of £40 on every Indian scalp and every captured red-skin: in 1720 a premium of £100 on every scalp; in 1744, after Massachusetts-Bay had proclaimed a certain tribe as rebels, the following prices: for a male scalp of 12 years and upwards £100 (new currency), for a male prisoner £105, for women and children prisoners £50, for scalps of women and children £50.... The British Parliament proclaimed blood-hounds and scalping as 'means that God and Nature had given into its hand'."* Indeed "the nations bragged cynically of every infamy that served them as a means to capitalistic accumulation, if it was a way to accumulate capital"! **

Material stimuli, as is well known, are a great thing. All the more so when they have the role of principal stimulating factor. And if it was possible to kill people, then what hope was there for animals? People became killers.... "We killed as if impelled by some diabolical obsession to destroy every wild thing. We killed for sale and we killed for sport, just to see the fur or feathers fly. We killed on suspicion and on prejudice."***

The annihilation of a number of Indian tribes was bound up also with the annihilation of the animals which were the basis for the Indians' existence. The

* Karl Marx, *Capital*, Vol. 1, p. 705.

** Ibid., p. 710.

*** R. Parson, *Conserving American Resources*, p. 274.

Indians did not have domesticated grazing animals and did not need them. The huge herds of bison, prong-horned antelopes and forest deer and innumerable flocks of birds fed their skilled hunters. The Indians killed only as much as they could eat. But the whites slew bison, for instance, just for their hides or even for the tongues of these beasts. "One must be mad to do that," the Indians said. Now it is clear to the Americans themselves that the Indians were right on the whole.

From 1870 to 1875 about two and a half million bison were killed every year. Yet already since 1830, that is to say, for a period of just over forty years (!) a campaign for their general extermination had been conducted and the railway companies invited passengers to shoot at animals from the carriage windows.* Rightly calling this slaughter one of the most shameful crimes in American history, Parson notes: "Doubly tragic was the fact that Indians themselves sold for a pittance the hides of animals upon which their very lives depended."**

Greed invariably goes along with ignorance. Pushing ahead irresistibly, seizing ever new territory, acquiring wealth, the colonisers believed that they could do everything, that any obstacle in their way should be removed. Already in 1894 the American geologist and anthropologist W.J. MacGhee thus proclaimed man's mission in transforming the animal world: "In the subjugation of the animals of the earth, men preserve only those that can be enslaved, and all others are slain."***

As has been said, there was no lagging in the slaughter. And this is not surprising, since destruction of the environment was not only profitable and unpunishable, was not only justified by the existing morality but was

* Jean Dorst, *Avant que nature meure*, Neuchâtel, 1965, pp. 54-55.

** R. Parson, *Conserving American Resources*, p. 275.

*** William O. Douglas, *The Three Hundred Year War*, p. 127.

considered virtually obligatory.

To this day Americans (and they are not the only ones) bitterly recall the slaughtered bison. Fortunately, particular specimens of the breed have survived, they have been taken under protection and in Canada and the north of the United States the bison has now ceased to be a vanishing animal; their capture for zoos is permitted. The industrial importance of bison is still virtually nil and will remain so for many decades to come.

But the American continent has paid its dues to the white man by the total extinction of some species. The sorriest example is the turtle-dove. There used to be so many doves in North America that in some places the branches of trees broke under their weight! In 1810 just one colony of doves was estimated to contain some 2,230,272,000 birds! * When flocks rose into the air, they obscured the sun.

The Indians loved the flesh of turtle-doves and continually hunted them but were unable to inflict any noticeable harm on the existence of the species. But the Europeans set about things in a big way. Scores of hunters fired at the birds during their migration flights, not even bothering to pick up the dead birds. Special expeditions were mounted at nesting time to collect the plump fledglings that had not yet learned to fly. So as not to have to climb trees, the trees were felled. Already by 1880 only a few flocks of turtle-doves were observed migrating. In 1909 a reward of 1,500 dollars was offered for anyone who could provide exact information about even a single nesting pair of these doves—but nobody claimed the reward. The last turtle-dove died in captivity in a zoo in 1914. A species which had been exceptionally numerous and thriving had vanished forever.**

* Jean Dorst, *Avant que nature meure*, p. 46.

** Ibid., pp. 47-48.

The northern part of the American continent was one of the greenest and most fertile lands, adorned with amazing forests. Here were white pine, reaching a height of 50 metres, red pine, hemlock spruce, sugar maple, ash, yellow birch, oak, Douglas fir, red cedar, dozens of other varieties and, lastly, the magnificent sequoia, or mammoth tree. Occupying about half the present territory of the United States, these trees greeted the settlers in solid ranks. And they were felled to the ground. The clearing of forest for farming, the making of charcoal for metallurgical production, the provision of railway sleepers and building materials, as well as forest fires led to the fact that today timber of high quality is preserved only in a very small part of the primeval forest area.*

How many battles were fought for America's forests, how many laws for their preservation were passed, how many frightening floods were caused by the reckless destruction of forests in river basins—but still the forests were not saved from danger. William O. Douglas quotes the letter of a logger which tells better than any documents the story and state of the forests of the United States. Here is the letter:

"My name is Bob Ziak. I am a clear-cut, height lead logger. I was born in Astoria, Oregon, 54 years ago. My father was a logger. My mother took me from the hospital to a logging camp to live. The forests are my life.

"At first the timber was virgin, production was tremendous, there were no controls and the resulting destruction and waste were appalling. I've clear-cut to the edge of a river, destroyed priceless streams, found jewel-like lakes within our cutting lines and left them as ugly holes staring into the skies. I've seen the eagle tree left

* According to some estimates the forest area in the United States was 170 million hectares four hundred years ago—today it is only eight million hectares.

standing all alone only to see the birds leave and the tree die because each needed a stand in order to survive.

"I helped log thousands of clear-cuts, saw the animals move in and then come under the murderous cross-fire from hunters on the network of roads, with no place in sight to go in their terror-stricken flight.

"I am deeply concerned about our forests. They are disappearing—from 600 years of age to 35. Men planted in solid blocks, tree farming if you wish, but our forests are going, going, gone.

"Detach yourself from this earth and look down on us from the heavens above. Gentlemen, this is all there is. There is no more and the time is running out."*

Time is running out, forests and rivers are disappearing, minerals and soil are being exhausted. And perhaps man will ask himself some day: how was it possible that he, being a rational creature capable of feeling sympathy, was more cruel than the fiercest wild beast? Could his reason allow and justify all this? And then he will appreciate what the Indians said in amazement long ago: "How can the spirit of the Earth like the white man? Everywhere the white man has touched it, it is sore."**

The pioneers thought that they were surrounded by enemies. But they themselves were their own greatest and most merciless foes. Gripped by the fever of enrichment, regarding an alien land not even as capital but as a "speculation fund", a "seam of ore" (J. Dorst), they strode over it like the Attilas of modern times. Nothing either on the surface, or in the rivers, or under the ground, escaped their greedy eyes.

Calculations made in 1939 show that in the 150 years' history of the United States not less than 114

* William O. Douglas, *The Three Hundred Year War*, p. 142.

** Ibid., p. 9.

million hectares of good land had been destroyed or, at least, impoverished. Apart from this, accelerated soil erosion over an area of 313 million hectares of land removed a considerable portion of the topsoil. Degeneration affected about 600 hectares a day, or 220,000 hectares a year. Every year 2,700 million tons of solid material is removed from the fields and pastures of the United States. Even if one takes natural erosion into account, these figures strikingly show the impoverishment of soil that was almost untouched 150 years ago.*

Not only the soil has been and is being impoverished. California possessed the best fishing grounds in the United States for salmon, but in 25 years they were exhausted. The Chinook salmon in the Sacramento River was virtually exterminated by intensive fishing between 1864 and 1882, that is to say, in the course of 18 years! The felling of forests unleashed turbulent rivers. Floods like that of the Mississippi in 1927, of the Ohio in 1936, of the Missouri in 1947, of the Columbia in 1948, in Kansas in 1951 and in California in 1952 and 1962 which cost many lives and did damage estimated at many billion dollars**—that is the boomerang cast by the first white settlers of the American continent and returning in our day. The pioneers were heroic people but the aim of their endeavours was often far from heroic. The crazy races between dog teams in Jack London's stories with their romantic aura offer a good illustration of fearlessness and aggressive greed, for, as a rule, these were part of the "gold rush" to claim gold-bearing tracts of land. Heroism is only true heroism when it has an ideal, a lofty noble aim. Bravery, strength, resolve that are guided by riches or power are not a blessing to society but a danger to it.

* Jean Dorst, *Avant que nature meure*, p. 148.

** R. Parson, *Conserving American Resources*, pp. 108, 375.

The gold-rush fever that gripped the country many times was not the worst evil from the environmental point of view. Operations were not so extensive and did not inflict great wounds on the Earth. The destruction of many tracts of virgin nature as a result of exploiting mineral wealth was largely connected with the extraction of coal and oil.

It was not immediately, not in a single day, that the gold-digger's pick and spade were followed by excavators, bulldozers and trucks and in place of dog-teams came railways, motor vehicles and pipelines. But still the changes came fairly rapidly. Small prospect holes were replaced by pits and boreholes, then by opencast workings that today resemble deep fractures of the Earth's crust. This was the common procedure in the mining industry all over the world but much of what the young American mining industry did has virtually no precedent.

This is what W. O. Douglas writes: "An old mining law dating back to 1872, when the open spaces of the West seemed endless ... gives almost unlimited entry into public lands (including national forests and grazing areas) to make mining claims. The establishment, maintenance, and the validation of these claims under this law is easy. Even as respects 'wilderness areas' (set aside under the 1964 Wilderness Act), the same mining rights are preserved until 1983.

"By reason of the 1872 Act private persons having claims can work them within the 104 million acres of Forest Service lands. Up to the end of 1971 the Forest Service had no records of what claims were being worked; nor did any other federal agency. Claims must be filed in the county courthouse; but only backpackers and the trail riders report the activities of mining claimants."*

* William O. Douglas, *The Three Hundred Year War*, p. 113.

One should add that there were few reports not only of what was being done but also of how operations were conducted. The federal agencies did not know and in many cases even today do not know. This made it possible for the owner of a mine, for instance, to adopt the so-called room-and-pillar method of working coal seams. The essence of it is that only about half the coal is extracted while the other half remains in the form of pillars supporting the roof. It is a much cheaper method than the usual one—there is no need to buy pit props, to hire extra labour, employ more transport and so forth. The cost of such economies is the loss of about half the coal in the coalfield.

Enormous losses were due to the preferential mining of the better coal and the neglect of low-quality and deep-lying seams. The most amazing thing is that even at the present time the federal government and state authorities have little power to influence the mining companies. "The laws have been weak and, even so, disregarded by the mining companies," says Douglas*, pointing out that the mining lobbies are extremely powerful.

Speaking of North America it is important not to overlook the fact that it was not on the whole in any way exceptional. Undoubtedly the territory of the present-day United States was more rapidly opened up than any other territory and with greater losses and greater ruthlessness. But other territories were also being opened up at the same time—capitalism was conducting a global onslaught on nature. Thickly populated Europe, already feeling a shortage of timber, continued the policy of the Middle Ages of felling forests and was exterminating large animals. At some time in the early seventeenth century the last aurochs perished and bison,

* Ibid., p. 118.

mountain goats, chamois and bears almost perished, as well as wood-grouse, eagles and bearded vultures. Many marshes were drained and almost all the land suitable for farming was ploughed up. South America, which is regarded as the best preserved territory, paid forfeit to the capitalist age by the almost total extinction of the wild chinchilla and wild llama, by the death of the south sea-bear and by profound changes in the fauna of most of its islands. Despite the uniqueness of its historical development and the existence of a cult of life among many Asian peoples, Asia was "enriched" by savannas, semi-deserts and almost lost such exotic animals as the Indian one-horned rhinoceros, the Java rhinoceros and the Sumatran two-horned rhinoceros. There was a sharp fall in the number of elephants, wild camels and lions. The Indian leopard became extinct. The saiga was on the verge of extinction. Irretrievable harm was done to the wildlife of the oceanic islands, to which the white colonisers took their own animals, and they resolutely crowded out the local ones.

The island birds suffered most of all. From the moment when he became *Homo sapiens* man has learned to appreciate beauty in the university of nature. It was in nature he came to know beauty, nature ennobled his soul and helped to enrich his emotions. But always alongside this path towards appreciation of beauty and emulation of it there existed another path—that of adorning oneself in borrowed beauty, the beauty of nature, that of replacing one's own deeply experienced beauty of spirit with outward, imitative, usurped beauty. It was in the latter way that many birds of our planet whom nature has too luxuriously endowed, perished and continue to perish.

The native inhabitants of the islands adorned their clothes and head-dresses with feathers, killing no few birds for this purpose, but they did not threaten the

birds' existence. Rapidly growing capitalism, engulfing the islands, destroyed this primitive practice. Having destroyed the forests on many islands, it destroyed the forest-dwellers too. Making an absolute of material consumption, it steadily directed it towards aping. The demand for plumage and hides rose to unprecedented levels. Fashionable women throughout the world suddenly wished all alike to adorn their heads with birds' tails and their shoulders with furs. The demand stimulated the hunting.

Many eighteenth and nineteenth century hunters made a lot of money from kangaroo hides. The kangaroo has not yet vanished but all the same the unique wild life of Australia has suffered great losses. Millions of koala bears have paid a high price for their amusing appearance. The black Australian emu is extinct. Those beasts of prey—the pouched mole and the marsupial wolf—have virtually been exterminated. About 35 species of marsupials face extinction.

The fate of many African animals is tragic. The northern part of the continent has in essence been devastated—there the Romans were already at work. Southern Africa came into close contact with Europeans in the eighteenth century, when they settled in part of the African lands and began to move north.

Among African hoofed animals the first to be exterminated was the blue horse antelope. Then several species of zebras and antelopes met their deaths and vanished forever from the face of the Earth. The areas where herds of elephants, giraffes and rhinoceroses occur decreased sharply. It was easy and interesting to kill them, while the spread of photography stimulated the desire to be reputed a great hunter. The extent of the slaughter may be judged by the following figures: by 1880 from 60,000 to 70,000 elephants a year were being killed to meet the demand of the European market. This

closely resembles the extermination of bison. The result was virtually the same: extremely rich natural resources vanished in less than a century.

The facts I have cited give a picture, however incomplete, of the worldwide destruction of the world of nature from the very first days of the growth of capitalism in the world of man. And nothing could restrain this mighty wave of rapacity. The greed for profit, which became the determining factor of the seventeenth, eighteenth, and nineteenth centuries, affected everybody in the same way. The history of Asia has brought down to us entire religious systems based on reverence for life, a reverence which the great twentieth century humanist Albert Schweitzer tried to revive in a new form, but capitalism, stepping onto the Asian continent, overthrew these systems. The natural environment of Africa is capable of an exceptionally abundant reproduction of life, but at one sweep capitalism restricted this capability.

An extraordinary war spread across the globe in which only one side did the shooting. L. Bauer and H. Weinitschke cite terrifying data: in Europe alone over 29 million animals were killed for their furs in 1928; Africa provided 800,000 antelope and gazelle hides and monkey skins; Australia—2,550,000 opossum and kangaroo skins; Oceania—1,120,000 skins of pinnipeds (seals and sea-lions). It would take a man working eight hours a day three whole years just to count that number of hides.* Hunting rifles were fired, as may be seen, without ceasing. But the hunters never suspected that their bullets, which robbed hundreds, thousands and millions of animals of life, would start on a long journey through time to erupt suddenly many years later as a vitally

* Ludwig Bauer, Hugo Weinitschke, *Landschaftspflege und Naturschutz*..., Jena, 1973, S. 271.

important problem for particular countries, whole continents, for the Earth as a whole and for the whole of mankind. The enthusiastic hunters did not pause to think that the few dollars, yen or pounds, they were putting in their pockets were a thousandfold greater sum borrowed from the future.

Against this background of the general conquest of nature where did science stand, what role did it play and what did it urge people to do in relation to the world? For it was a period during which such splendid thinkers as Kant, Fichte and Schelling lived and worked. It was the age of the great Hegel. It was the age of Karl Marx and Frederick Engels. How was the start of this global devastation reflected in social thought and in theoretical views of the world?

*Descartes, Spinoza, Leibnitz, Kant and Hegel
With brains equipped for an immortal task
Come, tell me in what vice of logic you've clasped
The world
To smooth it with a file to unity? **

This theoretical view of the world is marked in the first place by the fact that both for natural scientists and for philosophers in the period of the rise of large-scale manufacture, nature, as Engels said, was not seen at all as something historically developing and possessing its own history in time. Attention was turned only to extension in space: the various forms were grouped not one after the other, but only one beside the other; natural history was valid for all periods....**

Human knowledge was quite unable to soar over the Mont Blanc of old notions. In doubt it sometimes tried even to renounce gains that had already been made. The

* Emile Verhaeren, *Le multiple splendeur*, p. 59.

** Frederick Engels, *Dialectics of Nature*, p. 194.

theologian Copernicus dismissed theology. A century and a half later the mighty intellect of Newton again equipped science with the postulate of the divine first cause which was the beginning of motion and of the existence of nature. The man who had summarised the achievements of Galileo, Kepler and Huygens, the discoverer of the law of universal gravitation and of the fundamental laws of classical mechanics, the founder of differential and integral calculus, who argued that knowledge of nature should be based on practice and should bear fruit, was unable to go beyond the bounds of the old philosophical notions.

In Newton's view matter remained a profoundly inert substance, occupying an absolute void that was ever the same and immobile. The colossal, almost mystical authority which Newton enjoyed in the science of his own day was a disservice to science. Just as the "divine" Aristotle had been uncritically accepted before this, so did Newton too long stand above criticism. The broken circle was again joined in his works. "Natural science, at the outset revolutionary, was confronted by an out-and-out conservative nature, in which everything remained today as it was at the beginning of the world, and in which right to the end of the world everything would remain as it had been in the beginning."*

Philosophy earned itself undying fame by the fact that it was a philosopher who made the first breach in the wall of the world outlook created by the science of the day. In 1755 there appeared the *General Natural History and Theory of the Heavens* of the young Immanuel Kant. At last the solar system had received its genealogy. Kant rejected Newton's first divine impulse, suggesting the idea of a beginning for the existence of heavenly bodies, and advanced the hypothesis that the

* Frederick Engels, *Dialectics of Nature*, p. 194.

solar system had arisen from a huge cloud of rarified gases, particles and matter.

Kant's cosmogonic theories may be compared only with the studies of Copernicus. It is no exaggeration to say that they were of colossal importance for the development of man's theoretical and practical attitude towards nature and helped him to understand the natural phenomena occurring on the Earth. Kant's path, turning to the heavens for an elucidation of the Earth's secrets, was, one might say, the common path of philosophical science. It may be that the influence was felt here of the inertia of centuries—old appeals to God, or that the convenience of observing the stars attracted him, but many scientists both before and after Kant sought the explanation of human existence in the heavens.

Kant's discovery, in Engels' view, contained the point of departure for all further progress. "If the Earth was something that had come into being, then its present geological, geographical and climatic state, and its plants and animals likewise, must be something that had come into being; it must have had a history not only of coexistence in space but also of succession in time."* The foundations of the evolutionary theory had, essentially, been laid. A crushing blow had been dealt to the old metaphysical theories which denied the development of nature and ascribed its creation to Almighty God. They were in practice never able to recover from this blow.

The breadth of Kant's view was truly amazing. He undoubtedly had the gift of seeing a great deal in the laws and phenomena of nature. But, possibly, precisely this range of observation made the great philosopher doubt whether in fact nobody was guiding nature. Kant made one concession after another to teleology; repeat-

* Frederick Engels, *Dialectics of Nature*, pp. 26-27.

ing the many times refuted views of Aristotle, he came to the conclusion that nature's existence had a beginning and that it had developed from chaos into a perfect creation not of its own accord. And this, therefore, proved the existence of God. So Kant, who had enriched human thought with undoubtedly outstanding achievements, again returned to what had been the start of his own quests in natural philosophy.

Despite its certain lack of consistency, Kant's philosophy was high science. It was, if one may use the expression, too much science, it lay far removed from politics and social problems, and it did not teach one directly how to grasp reality. And it was precisely this above all that the capitalists expected from science, this was what the development of the productive forces of capitalism and its relations with nature demanded. A more effective, more political philosophy was needed.

The task of creating such a philosophy was undertaken by Johann Gottlieb Fichte, one of the most consistent idealists in the history of philosophy. Proceeding from an unconditional recognition of the primacy of consciousness, Fichte attempted to abolish the gap between reality and thinking, between theory and practice. But the Fichtean "spirit", as Marx and Engels put it, ever further separated itself from nature* and Fichte "not only departed from nature but in his philosophy generally ignored the problems of nature. Fichte's philosophy contains no natural philosophy...."***

The continuer of Kant's work in the field of natural philosophy may with certain justification be considered to be Friedrich Wilhelm Josef von Schelling. The interest shown in nature by the capitalist society that was gain-

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 4, p. 139.

** Maximov, "Introductory Article" in Hegel, *Works*, Vol. 11, Moscow, 1932, pp. XXXV-XXXVI (in Russian).

ing in strength was most strikingly manifested in Schelling's works, which evinced the philosopher's quite deliberate striving to break through into the sphere of the natural sciences and applied studies. It was precisely from Schelling that "the breath of nature wafted freshly through the chambers of abstract thought".*

Schelling entered the philosophical arena in a happy time for science. World scientific circles were hearing for the first time the names of Galvani, Volta, Oersted, Lavoisier, Lomonosov and Brown. Knowledge was gaining strength, discoveries in the field of natural science were following one after another. Scientists were ever more actively called to government service, the doors of palaces were opened to them and, it might have seemed, royal personages were beginning to need the presence of a physicist, mathematician or chemist just as until quite recently they had needed the presence of an astrologer.

Schelling was young, handsome, talented and knew many languages. He was able to explain precisely the fundamental law of the progress of human thought—the link between the directions of its quest. He also saw that only philosophy could offer some most general, universal explanations of the material world unfolding ever more widely before man, and of man's increasing object—sensory activities.

But Schelling overestimated philosophy and its method. He overestimated its powers so much that he proposed philosophy and its principles as the starting-point for solving difficulties in the field of natural science. He was convinced that one could use philosophical categories to give a true and profound explanation of any phenomenon. For Schelling there were no inexplicable phenomena.

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 2, Moscow, 1976, p. 237.

His faith in the power of logic and the strength of reason was so great that he transferred all nature, as it were, to thought. Objects and notions of them were seen to be just a duplicate of a single spirit. The relation of cause to consequence proved to be just a reflection of the process of knowledge. Physics became only the practical application of Schelling's philosophy and so forth. In Schelling "the whole task of natural philosophy ... was reduced to extracting the fundamental notions of nature from the principles of philosophy lying outside the range of experiment"* . And his bright ideas about matter, motion, the interaction of material forces and about gravitation, which were at bottom profoundly true, were lost in his idealist constructions. Thinking of nature originally as a great organism and sharply objecting to its mechanical interpretation, Schelling ended by again endowing nature with the "world soul"—in the shape of God—of which it had already been so often deprived. In consequence matter too was seen by Schelling in a fully idealist light.

It was characteristic that in all his logical quests in the field of natural philosophy Schelling was guided by a really true and really fruitful idea of the growth and general connection of phenomena, the very idea which became the powerful scientific tool of Hegel. And not only of Hegel. Reflecting the notions of natural phenomena and of the discoveries of the natural sciences in an idealist form, Schelling's views nevertheless exercised an enormous influence on an entire generation of scientists, among whom one may name Oersted, Haeckel, Mayer, Oken and Steffens, and upon the whole of European culture. And although idealist philosophy often presents Schelling just as the creator of "transcendental ideal-

* Maximov, "Introductory Article" in Hegel, *Works*, Vol. 11. p. XXXIX.

ism", rejecting his natural philosophy, precisely the latter was his most notable contribution to the development of the understanding of the world and to theoretical notions of nature.

It is characteristic that Hegel too began his philosophical studies as a natural philosopher. At that time he largely shared Schelling's views and even published a journal jointly with him. But later their ways parted. Striving to create his own universal system of philosophy—this striving, it is well known, was to be found among many German classical philosophers—Hegel declared war both on Kant's views and on Schelling's. He rejected both Kant's subjective idealism and Schelling's intuitivism.

But Schelling's idea of the development and general connection of phenomena became the centre of Hegel's world outlook and in Hegel it gained an almost self-sufficing significance. For Hegel the most important thing was the process, the connection between processes. Every body, every phenomenon was engaged in some process, either in the quality of the condition or in the quality of the product. But the sources of these processes were to be found somewhere outside them. The real integral whole proved to be something that was mobile, stirred to growth by some external force, and only this force established the connection between and the movement of the phenomena of the world. If there were no such force, then the phenomena, the objects of the world and the entire totality of nature would prove to be tattered, scattered and alien each to the other. Their internal bonds and mutual interdependence would vanish.

What then was this mysterious force which united and moved nature? Hegel gave the following reply: "We should regard nature as a *system of stages*, each of which necessarily issues one from the other ... moreover here

there is no *natural*, physical process of birth, but there is only birth in the bosom of the inner idea which constitutes the foundation of nature. Only the concept, as such, is subject to *metamorphosis*, for only its changes represent its development.”*

The great power of development of the material world is, consequently, just a concept, an idea. Herein lies one of the basic errors of Hegel’s natural philosophy, which for many years afterwards shaped the criticism of it. Nature develops not by itself, development is not its qualitative distinction, the state which is immanently innate in it, but is only a reply to the requirements of the development of the idea. The dialectics of nature, therefore, lies not in nature itself but in consciousness, in the brain of the scholar. The Hegelian system, as Engels said, ascribed historical evolution only to the spirit and in this Hegel fell far behind Kant, whom he criticised.**

His gigantic erudition, comparable perhaps only to that of Bruno, multiplied by a no less gigantic capacity for work did not help the scientist of genius out of his predicament. Conceiving the development of nature and society as a great historical process, embracing with his intelligence virtually the whole of the science of his time, Hegel’s dialectics did not find in nature its own motive forces and thought nature only the imperfect reflection of the absolute spirit and the absolute idea. And although Hegel’s absolute spirit was a far from ordinary concept, something all-penetrating, embracing both nature and society, and thought itself, nevertheless his idealist approach not only did not bring a theoretical understanding of the world closer to the practical atti-

* G.W.F. Hegel, *System der Philosophie. Zweiter Teil. Die Naturphilosophie*, Stuttgart, 1929, S. 58.

** Frederick Engels, *Anti-Dühring*, p. 17.

tude towards the world, but even further separated them. The gaping abyss between the world and man became even wider.

It is hardly possible to explain all this simply by Hegel's idealism. His *Philosophy of Nature* is a treasury of remarkable thoughts, conjectures and surmises. But the point is that these thoughts were no longer needed by capitalists who had lost their revolutionary spirit and were gripped with the fever of practicality. To establish the existence of general interlinks embracing both the world of man and the world of nature was something that did not interest the capitalists, and merely hampered them. The narrowly practical approach of the capitalist was hostile to the unpractical intellectualising of the philosophers. There was a market only for learning that would serve to increase profits and to amass instant fortunes. The general trend towards crudeness found its philosophical expression in the emergence of vulgar materialism. Vogt, Buchner, Moleschott and others like them undertook the hard task that was too much for them, of moulding a new world outlook, but their efforts only led to old metaphysics speaking out again at the top of its voice and the natural scientists were again its victims. Natural science, which had made immeasurably great advances, required a world-view analysis, but no one could meet this demand. And many natural scientists took refuge in mysticism and spiritualism, trying if only by such a far from scientific means to fill the enormous gap that had arisen in the views of the world. Kant's, Schelling's and Hegel's natural philosophy was, as Engels said, thrown overboard and what a wretched replacement was found for it!

The empiricists, not wishing to hear any more about theoretical generalisation and turning away from dialectics, got into such a muddle that they allowed themselves to be carried away by various charlatans and began

to think seriously about the existence of "the organ of the state of prayer", "the fourth dimension" and other nonsense which Engels mocked so effectively in his article "Natural Science in the Spirit World".* "Dialectics," he noted, "cannot be despised with impunity.... The empirical contempt for dialectics is punished by some of the most sober empiricists being led into most barren of all superstitions, into modern spiritualism."**

It was only after Hegel's death that natural science presented philosophy with three major arguments, three remarkable discoveries. The law of the conservation and transformation of energy showed its profoundly material nature and indestructibility. Darwin's theory of evolution relegated man from being the lord of nature and the creation of God to being an earthly creature, the creation of nature, linked by inseverable bonds with life on Earth. The discovery of the cell demonstrated the knowability of nature and of the laws of its structure and once again confirmed the power of human reason. And the world view could no longer stay put on its old positions. Science heard the names of Karl Marx and Frederick Engels.

Turning "on its head" Hegel's idealist dialectics and taking as a starting-point the fact of "the whole of nature ... moving in eternal flux and cyclical course"*** and that man was a part of nature, Marx offered his analysis of a truly human attitude to nature, expressed in labour and in practice. In his hands the laws of dialectics gained their truly universal significance. Nature was seen as "the inorganic body of man". The main outlines of a new world view were ready.

It must be stressed that Marx arrived at his discoveries

* Frederick Engels, *Dialectics of Nature*, p. 50.

** Ibid., p. 60.

*** Ibid., p. 30.

not from natural science at all. He examined nature through the prism of society. Marx examined the age-old antinomy "man and nature" above all from the viewpoint of social situations and the process of production lying in one way or another at the basis of every phenomenon in the life of society and of its impact on nature. He thought it was impossible to reach "even the *beginning* of a knowledge of historical reality so long as it excludes *from* the historical movement the theoretical and practical relation of man to nature...".*

Thus it was precisely in Marxism that the problem of the interaction of society and nature first received a real starting-point for studies. It was precisely Marxism that removed the mystic veil from this problem and revealed the fact that the interaction between its two aspects was *social practice*. Consequently it was precisely society that determined, regulated and controlled it, proceeding from its material possibilities and sat aims, from its own character and spirit, in conformity with its own world outlook. In other words, for the first time not simply a philosophical but also a sociological analysis of the problem was provided, for the first time it was stated who was the master on this Earth of ours and who was responsible for its condition. And this already invited the logical conclusion that the introduction of harmonious relations into the utilisation of nature was, above all, the introduction of harmonious relations into the world of men and of social relations.

Showing that capitalism produces not only immense material wealth but also the universal alienation of man from the object, product and process of his labour, of man from man, of man from society and of man from nature, Marx determined also the fundamental condition

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 4, p. 150.

for the ending of this alienation—the creation of social conditions in which man could be moulded who was capable of truly affirming and assimilating the human essence of nature and of developing his own natural essence in every way. Only in such social conditions could the violated unity of the world of man and the world of nature be restored and the humanism of nature and the naturalism of man be effected.

The fact that the world outlook of Marx and Engels was of colossal significance and was—most important—a true step forward for science, was later to find powerful confirmation in the conceptions of V.I. Vernadsky, in the entire historical experience of socialism and in the life of all mankind. The fact that this world outlook was not just an explanation of reality but also an explanation of the connection between the past, the present and the future became ever clearer. The fact that it arose from the most profound needs of all mankind had already become indisputable.

The reaction of consolidated capitalism to the Marxist world outlook was quite unique. In 1878 Charles Peirce, the American philosopher, first used the word “pragmatism”. Within 20-30 years it was already a major philosophical trend, largely determining the American way of life and thought.

Pragmatism does not essentially contain a philosophy of nature. It is the philosophy of success, the philosophy of action. It is precisely to success and action that pragmatism subordinates everything else—truth, religion, matter and nature. I would say that pragmatism proclaims the approach of the American West to everything around us. In the view of pragmatists theory is above all of instrumental significance. The vitality of a theory is directly proportional to its success. Those ideas which are of value for real life are, from the viewpoint of pragmatism, true ideas. And truth in general is only a

particular form of what is good, therefore what is not good is not true.

Matter is also regarded from the same angle: "Give us a matter that promises *success*, that is bound by its laws to lead our world ever nearer to perfection, and any rational man will worship that matter...." Knowledge was viewed in the same manner: "We here assume Japan to exist without ever having been there because *it works* to do so..." because "*'the true', to put it very briefly, is only the expedient in the way of our thinking, just as 'the right' is only the expedient in the way of our behaving*".*

Thus pragmatism offers totally unlimited, quite uncontrolled freedom for arbitrary action both in the spiritual field and in reality. It is a theoretical foundation for money-making and utilitarianism. It is an indulgence for all the sins committed by capitalism. It is, lastly, a summons to further action in the same manner for "the world stands really malleable, waiting to receive its final touches at our hands. Like the kingdom of heaven, it suffers human violence willingly."**

And what did it cost to do violence to the world now that:

*The world is all astir with trains and ships.
Behold from East to West, from South to North
With strident violence
They rush and race;
Their signals and their whistles tear apart
The dawn, the noonday, evening and night
And their vast smoke-clouds spreading far and wide
Hedge cities in;*

* William James, *Pragmatism*, New York, London, Toronto, 1946, pp. 102, 207, 222.

**Op.cit., p. 257.

*The plain and shore, the billows and the sky,
The hollow thunder of the axle shafts,
The hoarse loud gasping of the roaring hearths
Do to the sound of great gongs here and there
And everywhere strike shudders in the heart
Of Earth.**

* Emile Verhaeren, *Le multiple splendeur*, pp. 109-10.

ards. It is the need to intensify world trade, to step up the struggle of the developing countries to preserve their natural resources and so forth. Each of these manifestations of the ecological crisis has political overtones which emerge ever more distinctly with the development of particular aspects of the utilisation of nature today.

This is most evident in directly ecological policies: the taking of steps to protect nature, the drafting of national programmes for combating the deterioration of the environment, the drafting of new laws to improve the utilisation of nature, the setting up of special bodies of state administration to control the utilisation of nature and so forth. But this is only one aspect of the matter. The political import of ecological problems is ever more widely manifested and given specific expression in class and international relations, that is to say, in the whole complexity of domestic and foreign policy.

The way in which political decisions are shaped by ecological considerations and environmental protection programmes depend on traditional politics was most strikingly shown by the energy crisis which descended upon the capitalist world in 1973-1974. It is important to stress here that the energy crisis is only a partial manifestation of wider shortage of raw materials, if it is regarded from the ecological viewpoint, and is a unique aggravation of the general crisis of capitalism, it is consequently both an environmental and a social and political manifestation.

For a period of many months the question of an energy shortage was featured in the world's newspapers and magazines. It is still today one of the most important themes of the press. From their own experience broad sections of the population in the major capitalist countries have clearly seen the possible consequences of a shortage of energy. The reduction of central heating, restrictions on the speed and hours of use of cars, cut-

backs in industrial production, price rises and the growth of unemployment, the aggravation of contradictions between imperialist powers—these were only its first visible consequences.

Today, when the acuteness of the energy crisis has lessened to some extent, attempts are often made to present it as a temporary phenomenon due entirely to a particular set of world circumstances. Such attempts will not bear examination. The energy shortage, like the ecological crisis as a whole, has deep roots in the very character of the relations between capitalist society and nature, in the state of its present utilisation of nature. Foreign policy causes only deepened the crisis, they only showed a portion of the upheavals which mankind may face in the future and for which the blame will lie with private property-owning society.

Taking a broad view of the energy crisis, of course, one may say that in many of its manifestations it was a phoney crisis. Yet when we turn to view the present state of the fuel-energy balances of several major capitalist countries, one must acknowledge the reality, if not of the crisis, then at any rate of the growing shortage. This contradictoriness is explained by the fact that the energy crisis was above all an oil crisis which it is very hard to class as a phoney or an accidental phenomenon.

The shortage of oil was not in itself unexpected and aroused no surprise. Forecasts of energy consumption have long ago taken note of the fact that the Earth's oil reserves are comparatively small (at present they are estimated at about 275,000 million tons), while its extraction is continually increasing. In 1974 the advanced capitalist countries and the developing countries extracted 2,325 million tons of oil—almost five times more than in 1950. It has been calculated that at present growth rates in consumption of oil the non-socialist world will exhaust its reserves in about 36 years' time.

The conclusion to be drawn might seem clear enough: to lay emphasis on other sources of energy, to improve coal mining, the treatment of fuel shale, to expand hydroelectric power, to make more extensive use of wind and solar energy and to build more atomic power stations. In other words, to develop power sources in a comprehensive way and thereby insure the economy against an "oil famine".

But the Western world seemed not to notice the danger that was threatening: its economies were increasingly turning to oil. The share of oil in the fuel-energy balance of the capitalist world increased from 26 to 50 per cent from 1950 to 1970, and that of natural gas from 12 to 23 per cent. The share of coal fell from 53 to 25 per cent during that period. While noting that during that period the total amount of energy consumed rose by 130 per cent, one must acknowledge that there was a truly gigantic growth in the consumption of oil and gas.

But the real significance of these moves towards the use of oil and gas can be seen only by considering their importance in the energy balances of particular countries. By the early seventies these two sources of energy accounted for 78.9 per cent of fuel consumption in the United States, 66.8 per cent in Western Europe (including 71.5 per cent in the six Common Market countries) and 73.2 per cent in Japan. The process of replacing oil and gas by other forms of fuel was so sluggish that even in the 1980s more than half the capitalist countries' energy needs will be met by oil.

Such a trend in the energy policies of a particular country is justified and expedient if it possesses exceptionally large reserves of oil and gas. Yet almost all the developed capitalist states lack not just large but any considerable resources at all of their own. For this reason, whereas in the United States imported oil and oil products reached 35.7 per cent of its consumption in

1973, the dependence of West European countries and of Japan on foreign imports was simply colossal. Japan is forced to import virtually all the oil it consumes—99.7 per cent. In 1970 West European countries were importing 96.4 per cent of their needs.

The situation that has arisen is one of almost complete *foreign* energy control of the major industrial states. This situation seems all the more strange because it is precisely the field of energy that should be (and is) continually receiving the closest attention of national governments, for the assured supply of energy is also a matter of defence capability, of economic growth, of scientific and technological progress and of transport, that is to say, of virtually the whole basis of the life of society, the normal functioning of its productive forces. Why then do certain powerful states with immense political experience seem not to have paid attention to such an important field as energy and to have proved unprepared for an oil shortage?

In answering this question capitalist propaganda for a long time tried to foist upon public opinion the view that the whole blame lay with the Arab states which imposed an embargo on oil deliveries to several countries in 1973. But the answer does not lie in this plane. The oil shortage showed with unprecedented force the whole perversity of capitalist utilisation of nature, the new bonds, closer than ever before, between political decisions and ecological problems, and the fatal influence of private property-owning interests.

The general public in the Western countries today has indisputable evidence of the fact that there was fuel in sufficient quantities, that the import reduction was insignificant and the "critical level" of national resources was by no means reached. At the end of the first week of January 1974, at the height of the energy crisis, in the United States, for instance, the amount of fuel in the

hands of the oil companies exceeded the critical level by the following percentages: petrol—seven per cent (in mid-February 1974—11 per cent), light fuel—98.5 per cent, heavy fuel—30 per cent. It is noteworthy that a surplus of demand over supplies of oil (production plus imports) was observed in 1963, 1964 and 1965 but there was no crisis in those years. In 1974 the positive balance in oil supplies was three times the deficit of 1973 but the crisis continued to deepen. Facts of this kind, which have become common knowledge, have drawn world attention to the sinister role of the major monopolies, whose actions confronted the economies of many countries with a real threat of disorganisation and compelled a review of important national programmes for environmental protection.

Which monopolies am I referring to? Like a giant spider, seven leading oil companies have enfolded the whole capitalist world in their web. Five of them are American—Exxon, Texaco Inc., the Standard Oil Company, Mobil Oil and the Gulf Oil Corporation; one of them is Anglo-Dutch—Royal Dutch-Shell and one is British—the British Petroleum Company. These companies constitute the immensely powerful organisation, the International Oil Cartel (IOC). The strength of the IOC is shown by the fact that in the early seventies it had in its control 70 per cent of the oil resources of the capitalist world, 65 per cent of its extraction and over half its processing and sale.

Without fear of exaggeration the IOC may be called the true master of the American, West European and Japanese energy markets. This master today dictates to the capitalist countries their fuel and raw material policy and hence largely their environmental policy. It was precisely the IOC which foisted upon them such a one-sided orientation towards oil. Over many years an unprecedented struggle was waged in the Western world be-

tween the coal and oil companies. The oil companies conducted a consistent policy of ruining the coal producers, they bought up their shares and closed down mine after mine, giving lack of profitability as the reason. They artificially contracted the "fan" of types of fuel consumed by the industrially advanced countries, forcing their economies to adjust themselves to the use of oil alone and, somewhat later, of gas.

This struggle was waged on a broad front, embracing new promising trends in the development of energy. It suddenly emerged there were no funds for scientific research in these new fields, that the construction of atomic power stations was slowing down "spontaneously", that hydro-power stations were too expensive and unpromising, and so forth. Resort was made to direct bribery of state officials and of entire national boards with a view to making governments prefer oil. It should be stressed that here the oil monopolies made exceptionally loud appeals to public opinion, proving that it was precisely their products which were least harmful to the environment.

In conditions of free competition the oil companies could not help but win this battle, because they had enormous resources at their disposal. Oil itself, as the most universal and effective fuel, argued in their favour. So did the low prices of oil, which could be reduced even lower at any moment, because the profits taken by the oil firms are simply fabulous. By the index of net profit per worker employed the oil companies (in the United States) were performing 5.9 times better than the "top ten" major industrial corporations, and an average of 6.6 times better than all other industrial corporations. The efficiency indices of the "big five" were particularly high. In terms of net profit per worker the American members of the world oil cartel did 5.6 times better than General Motors, 2.9 times better than IBM, 13.7 times

better than ITT, 17.7 times better than the Chrysler Company and 19.8 times better than Westinghouse Electric. In battles with their rivals the major oil monopolies seem truly invincible.

The energy crisis made clear both the strategic aims of their aspirations and the sources of their might. Gradually, step by step, the oil monopolies took the path of transforming themselves into power companies. By buying up the shares of coal-mining companies, they won control over the coal industry. They have secured for themselves a dominant control over the extraction of gas. They have unobtrusively acquired enormous resources of uranium and shares in the atomic power industry. Thus in 1970 the American "big five" were selling half the coal mined in the United States, they controlled 85 per cent of the extraction of natural gas, almost half the country's registered resources of uranium and 75 per cent of the capacity of new enterprises for extracting and enriching uranium ore. In other words, the International Oil Cartel had laid its hands on virtually the whole energy system of a number of Western countries and so its policy could not but change. Competition virtually ceased and one could raise prices. The grave forecasts appearing in the early seventies of the exhaustion of world reserves of oil created favourable conditions for an extended assault on the consumers of energy.

One may confidently state that in one way or another, in one form or another the energy crisis was provoked independently of the situation in the Middle East. One should not, of course, fail to note the significance of the Arab countries' embargo on oil supplies to the United States and Holland, which played a substantial political role and made the industrial capitalist countries become aware of new realities. But nevertheless the howls about the Arabs' "trump card" was only a screen and these howls were prompted by a desire

to lay the blame upon somebody else, to provoke panic and to conceal the way the monopolies were exploiting a situation they themselves had created.

Many instances are known today of the way the monopolies prepared public opinion for a rise in the price of energy. A very extensive propaganda and political campaign was launched to this end. For conducting such a campaign 150 leading newspapers in the United States received from the oil corporations in 1971 (the crisis broke out, as is well known, only in 1973-1974) 4,400,000 dollars and in 1972—five million dollars. The size of stocks was concealed, survey work was reduced, tankers were held up on the way and became concealed floating reservoirs. Leaders of the corporations that were members of the IOC made sad announcements that no more big new deposits would be discovered in the world and so forth. And although the extraction of oil in the non-socialist world rose by nine per cent in 1973, that is to say, rather more than during many of the preceding years, a patent shortage of oil products was created in the domestic markets of the advanced capitalist countries.

It is indicative that the energy crisis did not affect the level of revenues of the oil monopolies and did not prompt a crisis of profits. On the contrary. By jacking up the prices of oil and oil products the monopolies plundered the Western world with unprecedented success. Their revenues experienced a colossal increase. In the period from 1972 to 1974 the net profits of the five major American oil companies increased by 110 per cent and the relation of profit to basic assets rose from 6.4 to 15 per cent. In the same period the same index for the Royal Dutch-Shell Company rose from 6.4 to 23.9 per cent and for British Petroleum from 5.5 to 27.8 per cent. It must be emphasised that this rise in profits occurred at a time when the Arab countries made several

successive increases in the prices of oil (in the period from 1970 to 1974 the oil-exporting Arab countries were able to secure a more than sixfold increase in the price of oil).

This curious situation has two explanations. Firstly, the amazingly low cost of Arab oil, determined by the high natural productivity of the oil fields. The cost of surveying, preparing oil fields for exploitation and extracting oil in the Arab countries and in Iran is 15 to 20 times lower than in the United States, for instance. Secondly, the active offensive of the energy giants against control of the rise in prices. This offensive swept away many laws and as a result state control of the prices of oil products was suspended for a long term ahead. The monopolies were not the losers.

At the same time this victory by the oil monopolies was undoubtedly a Pyrrhic victory. They won yet another round in the battle with the consumers and this was sufficient to compensate in some measure for their defeat in another field—in their struggle with the oil-producing countries. Here they were dealt a very strong blow whose consequences are still far from clear. The strength of the Organisation of Petroleum-Exporting Countries (OPEC), formed in 1960, the birth in 1968 of a regional oil grouping of Arab countries (OAPEC), the nationalisation of the principal oil fields in Iraq, Libya, Algiers, Iran, Peru, Mexico and Venezuela, the growth of these countries' relations with the Soviet Union and other socialist states—all bear witness to the fact that imperialism is losing control over this very important object of exploitation and the monopolies are definitely being deprived of one of the main sources of their foreign profits. Capitalism is surrendering yet another position and the developing countries are taking yet one more step towards fully overcoming the heritage of colonialism and to asserting the sovereignty of the deve-

loping countries.

The energy crisis has reflected in bold relief the totality of the ecological and political problems of the non-socialist world. In the first place, it has shown that the plundering of resources, the machinations and swindling from which the oil monopolies so greatly prospered, were not simply isolated instances of rapaciousness but an organic evil of capitalism, an inseparable feature of capitalist utilisation of nature. The situation which arose in 1973-1974 and remains essentially unchanged today in the field of energy in the major Western countries demonstrates with particular force the contradictions between the social character of present-day production and the capitalist form of appropriation, it shows the result of the mindless exploitation of natural wealth, of the boundless greed for profit and the neglect of public interests.

Secondly, the energy crisis has made necessary a review of the whole problem of the supply of raw materials to the capitalist countries. The colossal dependence of these countries upon the import of raw materials has been revealed. Thus in the sixties and early seventies alone the percentage of imports in the volume of raw materials used in Japan rose from 52 to 79 per cent, in the Common Market countries from 65 to 79 per cent, and in the United States from 25 to 28 per cent. The United States is undoubtedly the country best provided with its own raw materials. But in the early seventies it too was dependent upon imports to the following extent to satisfy its needs: of aluminium—85 per cent, asbestos—75, nickel—90, zinc—60, thorium—100, titanium and rutile—100, natural diamonds—100, manganese—95, chrome—90, cobalt—75 and metals of the platinum group—75 per cent.

This dependence of the major countries upon imports will undoubtedly increase as the years go by. But that is

not the only point. An inevitable deepening of the raw materials crisis is approaching in a wide range of resources. The reasons for this lie not only in the more restricted possibilities imperialism has of exploiting the minerals of the developing countries, but also in a certain exhaustion of resources. The era of cheap raw materials has gone never to return, leaving the developing countries with plundered resources and advanced capitalist countries with the need to undertake the working of their own much poorer deposits and to direct unprecedentedly large investments to this end. All this has led to a sharp disturbance in the balance of payments of most countries importing raw materials, causing profound changes in the structure of their economies.

Thirdly, the energy crisis prompted both the supplier countries and the consumer countries of raw materials to work out political measures to regulate the extraction and distribution of the most important resources. Thus the countries producing copper united in 1967 in a special organisation—the Intergovernmental Council of Copper Exporting Countries—with a view to drafting and implementing a single policy in the field of copper exports. In March 1974 there arose the International Bauxite Association. The governments of Peru and Mexico have reached agreement on co-ordinating efforts to set up an association of silver exporting countries. The producers of other raw materials and foodstuffs, in particular iron and manganese ore, rubber and coffee, are seeking for ways of uniting in export associations. The profound meaning of these steps lies in offering collective resistance to the robber policies of the imperialist monopolies and from this point of view they are a major advance in the struggle of the peoples of the developing countries for their economic liberation from imperialism.

It is characteristic that the raw materials anti-cartels

are seeking mutual contact. Eventually this may emerge as a single political line in the raw materials market and it will not be easy for the industrially advanced countries to find effective political countermeasures here. The members of OPEC, for instance, have established a special fund to help the developing states and are preparing plans to help these states to set up modern extracting industries. National extracting and processing enterprises, companies and trade associations are being set up, and they ever more actively enter into the world raw materials market which was previously exclusively controlled by the companies of the Western countries. A situation is arising in which the developing countries, relying on the powerful support of the socialist community and utilising the favourable international situation, are evidently quite capable of achieving a decisive change in their own role in the raw materials market and ensuring that their raw material wealth enriches themselves in the first place.

The advanced capitalist countries are, of course, not waiting to be crowded out but are undertaking an active political counter-offensive. They are resorting above all to traditional attempts to split the international organisations that are being set up in the developing countries. At the same time an ever greater emphasis is being laid on unity of action by the importers of raw materials, on seeking measures that suit both the suppliers and consumers. In November 1974, mainly as a result of efforts by the United States, an International Energy Agency was set up bringing together 18 Western countries—the major importers and consumers of oil, with the exception of France. Buffer stocks of materials in short supply are being established, proposals are being announced for organising raw material banks, and national plans are being drawn up for ensuring self-sufficiency in fuel and raw materials, plans such as the much publicised Ameri-

can "Independence" programme.^{*} Unusually great attention is being paid to working on alternative sources of energy and finding alternative resources.

At the same time, while campaigning for unity of action, the advanced capitalist countries are keeping a wary eye on each other. Too fresh in their memory are the cases when oil tankers suddenly altered course and headed for the shores of America, reminding people of who after all opens or shuts off the flow of oil to the Western world. The "Independence" programme has not brought reassurance. Rather the opposite. Assessed as an extremely important document, this programme has caused great alarm among the United States' partners: when the United States has achieved "independence" will it not leave them to their fate? And although it is obvious that this independence can only be symbolic or cover a limited range of resources, Japan and Western Europe cannot hope to claim even such independence. They must seek their own paths.

And they are finding ways by establishing their own raw material and energy companies and making trade contacts directly with the developing countries, by-passing the multinational corporations that are under American control. Thus Italy through its oil concern ENI has virtually monopolised the extraction of natural gas and oil in the country and taken a considerable part

* The task of ensuring the United States' energy independence was put forward by President Richard Nixon at the end of 1973. About one year was spent on drafting the "Independence" programme. It basically contained an analysis of three "strategies": the accelerated working of domestic resources; the economising and control of energy consumption; and the implementation of programmes of emergency readiness. The general aim was to achieve either self-sufficiency or the invulnerability of the United States to an oil embargo by 1980-1985. The cost of the programme was estimated at the colossal sum of 500-600,000 million dollars. The programme has now been quietly shelved.

of the oil refining under state control. By merging several companies France established in 1965 the ERAP group, with several off-shoots in Italy, West Germany and the Benelux countries. In West Germany a state-monopoly super-monopoly is being set up which should to a considerable extent ensure the country's oil supplies. Japan has set itself the task of providing itself by 1985 with at least one-third of the oil it needs from oil extracted in the region of oilfields controlled by Japanese capital. European-Japanese groups of oil companies are being established to offset the IOC. For instance, several Japanese, Austrian, Spanish and West German companies have joined in the so-called "Zurich" group. Britain is in every way encouraging the tapping of oil deposits in the North Sea, and so on.

Many of these actions are regarded by the United States as a "betrayal", "ratting", "a stab in the back", "neglect of the common interests of the free world". There is obviously no trace of unity here. Wherever the new groupings and new national companies start operations, they inevitably run up against the IOC and the traditional "traders" in raw materials. It is a life-and-death battle, as is always the case with capitalist competition. It is no accident that the energy crisis gave rise to talk of the possibility of an "oil war" between the advanced capitalist countries.

All this does not strengthen the Western world and the inter-imperialist contradictions will inevitably increase. At the same time contradictions will increase between the advanced capitalist and the developing countries, since the former do not wish to surrender their positions in the raw material markets and the latter are no longer able to reconcile themselves to the plundering of their national wealth and to unequal trade relations. All this will necessarily bring a fresh rise in the prices of raw materials and fuel, and thus a rise in the prices of

consumer goods, cause a reduction in the rate economic growth, a fall in employment, a new wave of inflation and, ultimately, will ever further worsen the plight of working people. Capitalism has indeed got into a scrape, as an American journalist has said, if that word can be accepted as a synonym for the all-round deepening of the general crisis of an antagonistic society and the ever increasing bankruptcy of private property-owning practice in the conditions of an ever smaller and more united world.

From the viewpoint of the ecological problem the most important fact is that capitalism and the imperialist monopolies, facing economic and political difficulties, have without any particular hesitation sacrificed nature. Previously they sacrificed protection of the environment to the prospering of capitalism. Now they sacrifice it in order to continue capitalism's existence.

No one, of course, is blind to the fact that in recent years the Western countries have taken and are taking serious steps to protect the environment, and national governments have considerable possibilities in this field. Suffice it to say that in the United States, for instance, there are five major Federal commissions dealing with protection of the environment. These are the Federal Trade Commission, the Federal Power Commission, the Federal Communications Commission, the Civil Aeronautics Board and the Atomic Energy Commission. Apart from these three new Federal bodies have been set up—the Council of Environmental Quality, the Environmental Protection Agency and the National Oceanic and Atmospheric Administration. This organisational apparatus has the task of solving ecological problems both at national and international level and, supplemented by a broad network of government and public bodies, at state and municipal level too.

National government organisations for environmental

protection have been established in France, Denmark, Japan and many other countries. The expenditure under this heading is steadily increasing, laws are being passed and standards drawn up for the quality of separate components of the environment—air, water, noise and so forth. A system of subsidising environmental protection work has been defined: tax rebates, changes in the schedules for replacing equipment, grants, government guarantees of loans for building purification installations and so forth, although at the same time there remain in force tax concessions for tapping mineral resources which directly encourage the hasty and wasteful development of deposits of certain minerals. In the United States, for instance, only recently were the “subsidies” for exhaustion of oilfields abolished, which had been leading to a kind of artificial exhaustion of oilfields and the hasty, rapacious exploitation of oil deposits.

Neither laws nor subsidies nor loans, however, can radically alter the situation and they do not foster “ecological concern” in the owners of enterprises. The owners operate in general as previously, by-passing the laws, opening up new loopholes for the uncontrolled plundering of what is the inheritance of all mankind—nature. Many authors abroad are forced to admit that the organisational steps taken by a capitalist state do not guarantee the implementation of a sufficiently effective ecological policy, that the monopolies have ever new ways and means of putting pressure to bear on the state machinery. An indicative example: in 1965 the United States passed a law on the quality of water according to which a water pollution control board was established at the Department of Health, Education and Social Welfare, and the states were supposed to establish within their own borders standards of water quality and rules for the maintenance of these standards. The states took about four years to draft these standards and plans for

their observance remained unconfirmed even five years later. Moreover there was a clearly evinced tendency to reduce the standards if they affected the economic interests of the state. The Federal government organ either agrees to a compromise or else the introduction of legal standards drags on for many years.

The ecological policy of capitalist states cannot be correctly assessed without taking account of the typical features of modern capitalism. The capitalist of today is not just the owner of a plant or factory, a company or a concern, a financier or a merchant. He is in many of his manifestations an international figure. The growth of the international division of labour, dictated by the needs of production, and the corresponding growth of trade between states are an objective law of social development revealed by Marxism. "How far the productive forces of a nation are developed is shown most manifestly by the degree to which the division of labour has been carried. Each new productive force ... causes a further development of the division of labour.... These same conditions are to be seen (given a more developed intercourse) in the relations of different nations to one another."* The point is that on the crest of this new, deeper division of labour, which was a most important result of the scientific and technological revolution, there was the capitalist who was able essentially to escape altogether from the control of national states.

To capitalism, as Lenin said, fell the "progressive historical work" of linking "all countries of the world into a single economic whole"*** and of forming a world economy. But capitalism did everything to spoil the process of the unification of mankind and it gave rise to

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 32.

** V.I. Lenin, *Collected Works*, Vol. 3, p. 67.

negative features in the growth of the world market and of the world economy as a whole. The export of capital, the economic and territorial division of the world, the exploitation of the intellectual, labour and raw material resources of numerous nations by a handful of imperialist powers and, lastly, that invention of recent times—the multinational companies—these were the distorted forms in which capitalist international collaboration presented itself.

Today it is virtually impossible to compel, let us say, a multinational corporation to spend any considerable sum on environmental protection. If legislation requiring this is instituted in one country, the corporation transfers production abroad, continuing to pollute the atmosphere and hydrosphere without hindrance.

The pattern of activity of a multinational corporation is approximately as follows: from country A, where advanced industry exists but there are strict laws on environmental protection, factories making components and parts are transported to country B, where raw materials and a labour force with appropriate skill are cheap and where no effective system yet exists of measures to combat the destruction of nature. Then the components and parts are exported from country B to country C, where there is a lot of labour suitable for assembly operations. The final product is shipped to country D, which has the greatest demand for it and low import duties—in this way there will be the maximum profit. The corporation slips away like a snake from taxes, expenditure on purification installations and government control. Chaos is created in the market for labour, for raw materials and finished goods.

Like octopuses the major companies of the capitalist world, such as IOC, Ford, IBM, Phillips, St.-Gobain and Toyota, have spread their tentacles to the farthest corners of the planet. The headquarters of IBM, for

instance, controls 17 plants in 13 countries, hundreds of shops and warehouses, two-thirds of the world market for computers and a labour force of 250,000. There are General Motors and Ford plants in 20 countries, and General Electric, Massey-Ferguson and other multinational corporations have enterprises in many countries. There is essentially no way of compelling a multinational company to carry out the instructions of the government of a particular country which would seriously affect its economic interests. The corporation responds to the slightest pressure by threatening to close down or transfer production, and that means sharply to increase the percentage of unemployment in the country and to disrupt business life. It is also well known that in such circumstances several corporations can unite their forces. Such a situation is an extremely convincing illustration of the true cost of the "concern" of property-owners for protection of the environment.

As regards the oil companies, they did not deck themselves for long in the attractive garb of protectors of the environment. Having won possession of a considerable portion not only of oil but also of coal and uranium, they are throwing off the mantle of nature-lovers and are resolutely urging a lowering of environmental standards, the easing of control over pollution and the halting or abandoning of ecological programmes.

The oil, motor and coal mining lobbies, joining forces, are exerting such pressure on national governments that ecological policy is being distorted and the state organs responsible for environment are gradually giving way. Allocation of funds for ecological projects is being reduced, the schedules for installing purification plants are being extended, decisions on the introduction of environmental standards are being disputed and are not implemented. Thus in the United States the petrol suppliers contested in the courts the decision of the

Federal Environmental Protection Agency to reduce the lead content of petrol as of 1975, describing it as a theoretical and unproven demand. The White House advisers on science and technology did not uphold the agency's viewpoint and the agency was unable to prove its point unaided and to establish the link between the use of lead additives in petrol and the high lead content in the blood of Americans. The court decision went in favour of the petrol companies.

The review of ecological policies conducted under pressure from the monopolies has far-reaching social consequences. It is not just a case of the deterioration of the health of present and future generations, the continuation of the process of irrational utilisation of nature, the plundering of natural resources and the growth of pollution of the environment. Protection of the environment, which has become a field for the fairly profitable investment of capital, has given work to hundreds of thousands of working people in the Western countries. The production of purification and control installations, the erection of purification plants have grown into a major branch of industry in the last ten to fifteen years. And the postponing of the deadlines for installing purification plants at thermal power stations, for instance, at once deprives many people engaged in this branch of their jobs, raising the already high level of unemployment.

On the other hand, the stricter enforcement of this policy leads ... to the same result. The monopolies have learned with amazing rapidity how to manipulate ecological problems in their own interest not only in the economic but also in the social and political sphere. In the conditions of economic decline legislation on environmental protection often becomes a means whereby the owners of enterprises throw out into the street large contingents of workers, shorten the working day, intro-

duce a compulsory three-day working week, unpaid forced lay-offs and so forth.

Prices are noticeably rising. This rise is justified by the necessity for and high cost of measures to protect the environment and by the growth of production costs and it means that the monopolies are insistently and not without success trying to make the working people shoulder the cost of maintaining the quality of the environment. According to the American research organisation Chase Econometric Associates from 1972 to 1976 measures to restore the quality of the environment would increase the cost of particular groups of commodities in the United States by about ten per cent. It was anticipated that the population would pay about 75 per cent of the cost of restoring environmental quality. In the motor industry alone from 84 to 98 per cent of the "ecological" expenditure would be passed onto the consumer through higher prices.

The concentration of capital is increasing. Most small enterprises and farms are unable to acquire and operate purification plants and to master the new technological processes. For this reason the carrying through of environmental protection measures established by law is fraught with the risk of ruining a large number of small enterprises and farms, with a major new addition to the army of unemployed and with the movement of large numbers of the population.

Thus the ecological policy of the major Western countries is seen to be facing many adverse factors. Quite a number of these in one way or another affect the interests of the working people and worsen their situation.

But does this mean that ecology is "against the working people", as is sometimes argued in the capitalist countries by those who accuse the supporters of environmental protection of causing increased unemployment.

inflation and the energy crisis? No, of course it is not. The stepping up as well as the curtailing of ecological policies have adverse social and political effects in the specific conditions of capitalist society and through the specifically capitalist forms of their implementation.

At the very time when the ecological situation today would, it might seem, objectively create new jobs and weaken the position of the monopolies, the opposite effect arises in the conditions of an antagonistic society. Thus the implementation of a system of measures to protect nature calls for the involvement of an immense number of workers—but in practice millions of people cannot find employment. The protection of nature is indisputably a profitable enterprise—but only minimal capital investment is being made in it as yet. The exhaustion of many resources is becoming clear and replacement for them must be sought—but instead of this the companies are scrambling to exhaust the resources that remain.

Such developments are inevitable in a capitalist world. In the figures cited above of fantastic profits lie the roots of this inevitability. As long as it is less advantageous in crude terms of profit to protect nature than to plunder it, the world of greed for gain will necessarily and inevitably in every way oppose diverting its attention and funds away from today's sources of maximum profit to purposes benefiting grateful mankind in the future. Capitalism has always been least of all concerned about earning such gratitude.

The ecological crisis, as has already been pointed out, has yet another political aspect. The relations between the advanced capitalist states are gaining a new quality. The relations between advanced capitalist states and the developing countries are virtually being radically reviewed. And lastly, it is not without taking note of the impact of ecological problems that a profound turn is

taking place in relations between the two opposite social and economic systems—that of socialism and that of capitalism.

All this is determined by the fact that the ecological crisis in the totality of its manifestations emerges as a *fundamentally international problem*, a global one. It has laid bare the entire complexity of world economic links and, if one is merely to take the “oil shortage” example, the full harm caused both to the world of man and to the world of nature by wrong political decisions. The climate of relations between many states has noticeably changed.

These changes are, of course, far from straightforward ones. The limited amount of the reserves of certain types of raw materials, which concerns not only the economic but also the political and military-strategic positions of the advanced capitalist countries, gives rise to an organically innate desire of capitalism to solve its own problems at its neighbour's expense. And although leaders of the Western countries are calling for “united action”, “joint salvation” and so forth, so frequently that their appeals have already become banal, economic interest, understood in the capitalist way, is inevitably aggravating inter-imperialist contradictions. Complex collisions and conflicts between particular capitalist countries are arising ever more often on “environmental grounds”. The tension between oil-importing countries mentioned above, arising as a result of the actions of the IOC and the “oil moves” of the Arab countries, the “lobster war” between France and Brazil, the “cod war” between Britain and Iceland, the conflict of interests between Turkey and Greece over oil-bearing areas of the sea shelf, the bitter arguments between the states bordering the Rhine on assigning the cost of cleansing the river, the passionate accusations of the Scandinavians against industrialists in the Ruhr and in Britain, the smoke from

whose enterprises is "suffocating" Scandinavia—all this and many other facts are evidence that "ecological policy" is by no means becoming a field where the interests of the imperialist states coincide.

The national governments of these states are striving to balance the growing contradictions by the development of international co-operation. Today virtually every political and economic grouping in the capitalist countries—even NATO! —has special programmes, commissions and working groups on environmental problems. It is precisely at the level of these groups that the conflicts that arise should be solved.

The idea of such organisations, which are engaged in controlling the utilisation of nature, is undoubtedly a noble one. To co-ordinate measures for protection of the environment and on the treatment of a particular resource is to take a major step towards easing the raw material crisis as a whole and the energy crisis in particular. But such co-ordination is for the time being implemented mainly in theory.

What is actually happening is something different. International working groups, having co-ordinated the positions of the Western countries on ecological problems, are striving to speak out in a united front on these problems in the United Nations and in its commissions. In such cases the "spirit of unity" is most often directed to the outside. Through using the possibilities and the authority of the United Nations imperialism is trying to "regulate" the worldwide utilisation of nature in order to obtain one-sided advantages, to strengthen its own positions, interfere in the affairs of sovereign countries and to continue unequal trade relations. Here real co-ordination and unity of action is achieved but behind it stand the traditional and well-known aspirations of imperialism.

But the effective results of such aspirations are relent-

lessly diminishing. World trade links, the markets for raw materials, and concessions will no longer ever develop on the old basis established back in the time of colonialism, when raw materials were bought at the lowest prices and industrial goods were supplied at the highest prices, when agreements on concessions were concluded almost for centuries, the age-old owners of resources received a miserable portion of their true value, and so forth.

The main substance of the changes in the relations between the industrially developed capitalist countries and the developing countries lies precisely in the fact that the latter are resolutely taking the stand of equal trade partners while the former are learning to play the game according to new rules. And although in the West there are still quite a few leading figures who think that there is nothing more persuasive for citizens of the developing countries than the arrival in port of a glittering destroyer, these are, you might say, hangovers from the past. The situation is changing and the changes that are ripe cannot be halted. Attempts to continue the old policies only worsen the situation. It is clear today that, for instance, the energy crisis would cause the world considerably less concern if trade relations between the Western countries and the Middle East countries were established on a truly equal and mutually advantageous basis.

It is precisely for such co-operation that the Soviet Union calls in supporting the actions taken by the developing countries to review unequal and unjust relations with the consumers of their national natural resources. This is a matter of principle in the direction of Soviet policy. For over sixty years the Soviet state has unswervingly pursued a policy of supporting the struggle of peoples against colonialism, of co-operating with the newly free countries, and is giving them help and assistance. "We pursued this policy at times when we our-

selves needed even the most essential things. We firmly adhere to this policy now too," the USSR Minister of Foreign Affairs, Andrei Gromyko, said in an address to the United Nations in April, 1974.

Capitalism does not, of course, intend to accept the new realities straightaway. It resorts to menaces, demonstrations, threats of force, manoeuvres and the scandalous tactics of intelligence organs. And there will, evidently, be many more difficulties until stern necessity forces the monopolies to realise that in the modern world there is no alternative to equal co-operation with other countries and that the global ecological problem, which is producing a shortage of raw materials and a change in the conditions of human existence, leaves no room for gunboat diplomacy. A continuation of such policies will ever increasingly be accompanied by intensified anarchy of capitalist production, the plundering of world resources, unemployment, aggravation of the contradictions between the advanced capitalist and the developing countries, by the growing danger of adventurous acts by the imperialist powers and by many other negative developments.

Ecological problems also occupy an important place in relations between the capitalist and the socialist countries. The ecological crisis is the basis and focal point of many global problems which will in the years to come exercise an ever more noticeable influence on the life of each nation and on the whole system of international relations. "The Soviet Union, like other socialist countries, cannot hold aloof from the solution of these problems which affect the interests of all mankind,"* it was emphasised at the 25th Congress of the Communist Party of the Soviet Union.

* *Documents and Resolutions. XXVth Congress of the CPSU*, p. 67.

In connection with the ecological crisis the importance of detente and of the peaceful foreign policy of the Communist Party of the Soviet Union and of the Soviet state appears in a new light. The global problems which largely determine the future of mankind can be successfully solved only in conditions of peace and equal co-operation between all peoples on Earth. It is precisely detente and the affirmation of the principles of peaceful coexistence that turn the attention of world politics to the problems of all mankind and open up fresh possibilities of uniting the forces of different countries in the decisive directions of scientific and technological quests. Only peaceful coexistence opens up the prospects of restraining, at least to some extent, the catastrophic waste of energy and resources linked with war preparations, makes it possible to organise the comprehensive tapping of resources which is the only acceptable way from the ecological viewpoint, and offers the possibility of regulating the state and utilisation of natural wealth of international importance—the high seas and their resources, the atmosphere, cosmic space, the rivers flowing across several countries, migrating wildlife and so forth.

The Soviet Union and other countries of socialism pay enormous attention to ecological problems in their foreign policy. They call for securing the inalienable right of any nation to dispose of its own natural resources, freedom for the study and utilisation of international spaces and their resources, access to and equal participation of all nations in the exploitation of international natural resources without any discrimination whatsoever, the demilitarisation of international spaces and their utilisation exclusively for peaceful purposes without harming the interests of mankind in the future, the prevention of the pollution of international spaces, the peaceful solution of disputes between nations and so

forth. On many of these issues the Soviet Union has tabled specific proposals at the United Nations, which have met with the wildest political response and support from the peoples of the whole planet.

With particular attention mankind is following the development of co-operation between the USSR and the United States. Today joint studies by scientists of the two major countries of the world are being conducted on many problems. Ecological problems occupy an important place among them. And although such co-operation does not yet signify a complete identity of views on the problems being considered and it does not always proceed as one might wish, nevertheless one must not underestimate its serious importance. Born of detente, it is in itself a powerful stimulus to the deepening and materialisation of detente and it opens up prospects of the normalisation of relations in the world of man and consequently in the relations between the world of man and the world of nature.

*This day before dawn I ascended a hill and look'd
at the crowded heaven,
And I said to my spirit, When we become the enfolders
of those orbs,
and the pleasure and knowledge of everything in them,
shall we be fill'd and satisfied then?
And my spirit said, No, we but level that life to pass
and continue beyond.**

* Walt Whitman. *Leaves of Grass*, p. 69.

VII. FROM "ZERO" TO "ORGANIC" AND FROM "ORGANIC" TO "UNLIMITED" GROWTH

Listen to the Future coming
Breaking the ground...

Emile Verhaeren

The uniqueness of today's ecological situation and the multiple impact of the crisis of the relations between the world of man and the world of nature on the prospects of social advance have given birth in the Western countries to an enormous flood of futurological quests, forecasts and prophecies.

The appearance of such writings is quite understandable because the need to see the perspectives of historical progress over an ever longer period is becoming an imperative necessity in our time. The anxieties prompted by the present state of our planet foster the wish to look into the future and to assure oneself that mankind will be able to extricate itself from the situation that has arisen. Science, which has until recent years been divided up into branches and trends, is beginning to realise the integral nature of its object of study—the "nature-society-man" system—and is attempting to determine the basic parameters of the future improvement or degeneration of this system. All this prompts the emergence of numerous futurological centres, that are far from always scientific, of journals, associations and

forecasts that seem to flow as from a horn of abundance.

Many such forecasts are mutually exclusive. Light-hearted optimism, the ignoring of the dangers of an ecological crisis and cheap sensationalism are refuted by the prophecies of a "day of judgement", by tragic declarations and mathematically proven suppositions. But the main conclusion drawn from these contradictory quests is clear: broad circles of the public in the capitalist countries are seriously concerned by the state of the environment and the prospects of the further development of capitalist society. The studies presented for their attention, regardless of whether they are falsified or perfectly accurate, are an attempt by science and ideology to answer the unusually keen demand of large social groups for information about the future and for hopes of the future.

Although, as is well known, forecasts came into being along with human society, forecasts of the way the problem of nature and society will develop do not have a long history. After the studies of James Marsh, which were published in the second half of the nineteenth century, and of V. I. Vernadsky (early twentieth century), mankind was ecstatically reconstructing nature, not going to the trouble of worrying about the future consequences. These consequences began to be estimated on a world scale only in the early fifties. The late sixties and early seventies saw a real outburst of "ecological futurology", to the credit of which one may include such splendid studies as those of J. Dorst, R. Parson, K. Watt, P. Duvigneaud, M. Tanghe and others.

But they were not destined to become prospectuses of the future nor did they win the equivocal renown of global forecasts. Works of an entirely different kind appeared which posed the straight question of what lies in store for mankind tomorrow, and gave an almost equally precise and extremely confident answer. It must

be emphasised that most of these studies made the ecological situation their starting-point and were devoted to it.

The herald of the futurologist literature of the seventies may be said to be Alvin Toffler's book *Future Shock*, which was published in the United States in 1970 and was republished in many countries. The book was mainly devoted to the personal or human aspects of the future. But Toffler drew such a broad picture of rapidly growing changes in the life of today's industrial capitalist society and of the growth of its conditions of crisis in every field, that his treatment of the problem of nature and society, though it occupies little place in his book, could not but attract the attention of a very wide reading public. Toffler's numerous statements that time cannot wait and that society simply cannot allow itself to rush blindly towards super-industrialism, was a unique signal for a "bursting of the dam" that had been holding back futurology.

The first feature of this breakthrough was the rebirth of notions, that had arisen already in the early sixties and somehow immediately faded away, of "zero" economic growth. Moreover this rebirth took place on a broader basis and Sicco Mansholt, former president of one of the commissions of the European Economic Community, began to speak even about the stagnation of society as a whole, foretelling the death of the world by the year 2000, a world utterly devastated by the wastefulness of overprolific and overenterprising people.

Mansholt even identified the approaching era of the crises of capitalism with the approach of a new period in the life of all mankind, offering a rather unusual view of the growth of society as its state of crisis, and the state of zero growth as the normal state. In his opinion Western society would gain the possibility of being in harmony with nature and of creating a stable ecological

equilibrium only in conditions of zero growth. And only in such a society which had "frozen" its growth would there exist equal opportunities for all, the possibility of regulating consumption, of renouncing the drive for profits, and so forth.

Mansholt's utopianism prompted much comment and criticism at the time. Capitalist social science treated it with condescension: it was an amusing recreation for a leading official who found himself with nothing to do. Even more serious scholars had, they said, paid tribute to "zero growth". The "founder" of all global ecological models, Jay W. Forrester also thought that forces were maturing in the world that would halt not only the growth of population but also halt industrialisation and the raising of living standards. And William O. Douglas, who has already been mentioned, did not fail to declare that the time had come to put an end to contemporary economic growth for the sake of real growth. In the meantime the growth nevertheless continues! And this is what will solve all problems, including ecological ones.

The air of condescension vanished when the studies made at the request of the Club of Rome came to the forefront of public attention. These studies are, in fact, what is primarily meant when people talk about "ecological futurology".

A truly worldwide success greeted the first report of the Club of Rome, which was prepared by a group of researchers under the guidance of Dennis L. Meadows, professor at the Massachusetts Institute of Technology. Published as a separate book, this report was very quickly translated in dozens of countries and became widely known under the title *The Limits to Growth*. *

* *The Limits to Growth, A Report to the Club of Rome*, New York, 1972, p. 205.

Meadows' group differentiated five parameters—demographic growth, industrial and agricultural production, the utilisation of natural resources and pollution of the environment—accepting them as a sufficient basis for fully characterising the development of the “nature-society” system. It was also taken for granted that all these parameters altered according to an exponential, that is to say, they increased in geometrical progression and all these changes were interrelated. The model was then given to a computer which produced sensational answers to such questions as: what will be the growth in the world system if, for instance, the present rates of population growth are maintained?

The soulless machine added many new anxieties to our anxious age. It turned out that, if the population continues to increase at the present rate, by the year 2000 all the Earth's fertile land will be under cultivation. The bringing of new land under cultivation, the turning of sea water into fresh water and the making of artificial foods will require such an expenditure of capital and irreplaceable resources that by the year 2100 all these resources will be exhausted, industrial and farm production will be curtailed, the death rate will increase and a catastrophe will ensue.

But if the resources prove to be at least twice as great than contemporary estimates judge them to be, production (above all industrial) will reach a higher level than in the “standard case”, but then pollution of the environment will increase to such an extent that the mechanism of the biosphere will go out of action and again there will be an inevitable catastrophe.

Nor will technological progress save the situation. If we reduce the expenditure of raw material per unit of production by four times, let us say, then the growth of production and of the population could continue, but there would be a catastrophe due to hunger and the

shortage and exhaustion of fertile land.

The authors of the model consider that one may allow for an increase in the productivity of the land. But in this case industrial production must grow so sharply that again pollution will bring about a catastrophe.

Furthermore, even if the birth rate is controlled and technological progress encouraged, a world cataclysm will nevertheless ensue if there is any delay. In this case there would be three simultaneous causes of catastrophe: the raw material, ecological and food crises.

So it's a case of out of the frying pan into the fire. The prospect, the computer claims, is a short one—by about the year 2100 mankind will reach its "limits to growth".

I think the authors of *The Limits to Growth* did not themselves anticipate the stormy reaction that greeted their work virtually all over the world. And far from everywhere was the reaction favourable. The legitimacy of such modelling was disputed as well as the correctness of the principle put forward by Jay W. Forrester, on which Meadows' model was based, according to which the behaviour of a system is described by the behaviour of some of its components. In other words, doubt was cast upon the adequacy of the model. A slight correction of the input data gave scientists who checked the "limits to growth" on other computers totally different results. It was noted that the model took no note of the impact of scientific and technological progress on social, political and economic changes. The possibility was stressed of obtaining other indices, even if one took exactly the same initial parameters as Meadows took, and so forth.

Such criticism was largely justified and the authors of *The Limits to Growth* admitted it. But it did not constitute the main blow. This lay in the revelation that the model essentially took no account of social and political factors and took as its standard of values for the orienta-

tion of mankind the values of today's capitalist society, a society which has raised to a virtue the most insatiable and unrestrained consumption. The model had not reflected the bond between the "limits to growth" and the present state of the world, the private property-owning mentality of large numbers of people living on our planet.

It was herein that the principal defect of the model lay. The possibilities and the results of the interaction today between the world of man and the world of nature had been taken by Meadows only, so to say, on the economic and technocratic plane. The social character of the relations between man and the material world surrounding him was ignored. These relations were considered as being independent of changes in ideological, political and social orientations. The model had been formulated and calculated as if man did not and could not have any other aspirations than to devour the material basis of his existence.

Hardly had the heated discussion of *The Limits to Growth* cooled down than the Club of Rome roused world public opinion with a new report—a joint study by M. Mesarovic, director of the Systems Research Center at the Case Western Reserve University, Cleveland, and E. Pestel, professor of Hanover University, West Germany, which the authors entitled *Mankind at the Turning Point*.*

The second report to the Club of Rome was prepared essentially in parallel with Meadows' study, but nevertheless anticipated many of the criticisms of *The Limits to Growth*. It was compiled with recognition of the fact that no matter how all-embracing development trends may be, they cannot manifest themselves identically in

* M. Mesarovic, E. Pestel, *Mankind at the Turning Point*, New York, 1974.

all parts of the world, in regions that are totally different both in the level of their economic development and in their culture and ecological conditions. In other words, the limits to growth for one area may be quite different from the limits for another area. For this reason the report by Mesarovic and Pestel examines the world, mankind and our planet not in general, not as a kind of one-dimensional formation, but as a totality of different regions, each of which has its own features and laws of development.

Apart from this the second report essentially rejected the notion of Meadows' group of an alarming increase in mankind, exhausting and devouring absolutely everything, which was characterised in the first report mainly by quantitative indices. Such notions did not reflect the real growth, for in different regions its quantitative indices are so varied that at times one refutes the other: the population grows in one region, industry in another, resources are discovered in a third region and so forth. For this reason Mesarovic and Pestel based their model on a conception of the interdependence and mutually supplementary character of regions, resources and quantitative indices, expressing this in the concept "organic growth".

Taking as their starting point the principle of differences and similarities between the world's regions, the authors "assembled" regions of a similar type. Here the geographical location of a particular country was by no means a decisive factor in assigning it to a particular region. Note was taken, in the first place, of its history, way of life, political system, level of development, traditions and suchlike, that is to say, of its political, social, economic and cultural features. In accordance with this Mesarovic and Pestel differentiated ten basic regions of the modern world: 1. North America; 2. Western Europe; 3. Japan, 4. Australia, South Africa and other

countries with a market economy; 5. the USSR and the countries of Eastern Europe; 6. Latin America; 7. North Africa and the Middle East; 8. Tropical Africa; 9. South and South-East Asia; 10. China, North Korea, North Vietnam, Mongolia.

But this was only one, "horizontal" differentiation of the world which the authors of the second report to the Club of Rome proposed. They introduced yet another, "vertical" differentiation in conformity with the "nature-society-man" system, according to levels. There were six such levels: 1. geographical, including climate, soil, waters, resources and so forth; 2. ecological—the living substance of the planet; 3. technological—every sphere of human activity; 4. demo-economic—demographic processes and the economy; 5. group—social processes, particularities of collective behaviour and reactions; and 6. individual—a person's inmost feelings, mentality and biology.

Along with these basic lines of differentiation, the authors classified the world from other points of view too—they extracted a causal-consequential layer, a decision-taking layer, a layer of norms which fix and limit the process of goal-seeking, and so forth.

So it is an extremely complex model. It contains about 100,000 equations and makes it possible fairly specifically to analyse in all regions and at all levels such urgent problems as the economic, scientific and technological gap between the industrially advanced and the developing countries (regions), the food situation, demographic changes, energy and raw material resources and so forth. Each of these problems is examined in relation to others.

The authors conclude that world development can continue not as qualitative but as organic growth, in which the world will be a single system of interdependent and ~~and~~ various parts. If this does not happen, if

global crises are left to follow their own course or the decisions taken for influencing them are wrong ones or too late, then global catastrophes will occur. Offering several "scenarios" on each problem as illustration, Mesarovic and Pestel show how this could come about and suggest various strategies for dealing with crisis situations.

What are these scenarios as regards, let us say, the energy crisis? The authors take changes in the price of oil and calculate how they might affect the energy problem and world development as a whole.

The first scenario keeps the price of oil at the 1970 level, that is to say, extremely low. The developed countries will squander oil to such an extent that its reserves will be fully exhausted by the year 2000. Then will come economic decline and a rise in unemployment and social tensions will become intolerable. The Middle East countries will also be in difficulties—there is no oil, no revenue and industrial development will come to a halt.

The second scenario postulates the optimal price for oil. Prices may rise a further 50 per cent over the 1974 level. The revenues of the oil exporters will rise accordingly. But beyond that 50 per cent threshold the consumer countries will either limit their consumption or seek other sources of energy. So prices may rise by a half, but should not go higher.

How best to bring about a rise in the price of oil? The scenario shows that the rise should be a "creeping" one—by not more than three per cent a year. At such a rate of increase the Middle East countries will obtain the maximum amount of money and the developed world will make such advances that although growth will slow down after the year 2000 it will not become a decline. The conclusion is that if a long-term view is taken the interests of both the developing and the developed

countries coincide. Without intending any offence to the authors, we may say that this conclusion was no doubt greeted with loud applause by the leaders of the International Oil Cartel.

The conclusion reached by Mesarovic and Pestel extends to virtually the whole of world trade in natural resources, including fertiliser and food. Some countries should ensure the world market supplies of raw materials for a long time to come at balanced prices, others should plan long-term purchases. In general this fully accords with the aspiration of imperialism to keep the developing countries as a raw material base.

And what will happen if prices go beyond the limits fixed? Then repression will begin, the situation will be aggravated ultimately to the point of using force and of war. What turn can events take in this case?

First scenario. The Middle East countries, gradually raising oil prices to the optimal level (50 per cent above the 1974 level), stabilise the extraction of oil and begin to restrict supplies. The consumer countries take no steps. Conclusion: the Middle East countries grow richer, but become responsible for grave economic upheavals in the industrialised countries.

Second scenario. The industrial countries resist the policy of the oil-supplying countries. Alternative sources of energy are developed, oil is economised and high tariffs are imposed on products bought by the Middle East countries. Conclusion: the Middle East countries suffer greatly and have almost no accumulations of hard currency; the industrially advanced countries hardly suffer at all.

Third scenario. The industrial world and the Middle East countries co-operate, regulate the price mechanism sensibly, do not resort to one-sided decisions, the hard currency earnings of the oil-exporting countries are invested in the industry of the industrial world. Conclu-

sion: all gain. The industrial world advances, the Middle East grows rich and becomes a "capitalist" of the industrial world. Consequently there is no need to have conflict, one must co-operate.

The authors also analyse the prospects for the development of alternative sources of energy, picking out atomic energy. Their conclusions are not reassuring. If we suppose that in a hundred years' time mankind will satisfy its energy needs with atomic power (and in that time, according to forecasts, the world population will have increased fourfold), we must start immediately and in the course of the century continue to hand over for use four major atomic reactors each week and, if we take into account the replacement of reactors, two reactors a day. It is a fantastic task, for it takes seven or eight years to build and bring a single reactor into operation at present.

To this must be added the need for enormous transportation of radioactive materials and consequently the greatly increased risk of radioactive contamination of the environment and of man himself. Apart from this it will be difficult to site the large number of atomic reactors so as to guarantee safety.

On the basis of their analysis of scenarios for energy problems Mesarovic and Pestel propose a strategic variant to escape from the impasse. In the first place the oil producers must until 1985 give the industrial world as much oil as it needs to preserve its social and economic stability, receiving in exchange guarantees of participation in the exploitation of alternative sources of energy. Secondly, from 1985 to 2000 the shortage of oil should be made good by using coal, gas and fuel shale. Thirdly, transfer to the use of solar energy should be ensured starting from 2000.

Solar energy is the most "ecologically acceptable" energy. The possibility of its worldwide use on an

industrial scale has long been demonstrated theoretically. Technical problems remain to be solved. The authors think that if the oil producers invest their money in this work and if the governments of the advanced countries set about it as they did the space conquest programme, the problem will be solved.

Similar scenarios and conclusions are offered in the second report to the Club of Rome in respect of other problems too. The general conclusion to be drawn from these studies is the recognition of the basic fact that the crises now shaking the Western world are not temporary ones, that they express a persistent trend which the world can overcome only if it acts on a united front, develops "as a single body", and that co-operation, not confrontation, should become the general method of solving the conflicts and problems that arise.

It is hard not to agree with these conclusions, as well as with the view that the Western world faces profound social problems whose solution calls for radical changes in the way of life of each individual and in the relations of the world of man to the world of nature. One may be confident that there will be a profound response from millions of people to the notions—not new ones but ones that are shared and affirmed by the authors—of the process of internationalisation of the economic life and culture of mankind today. Also convincing are their views on the need to learn to perceive the world as a whole in the totality of its general pains and aspirations, and not just through the narrow channels of the problems of a particular region or state. The thought that one should reject crude desires to crush and trample on nature seems to have been borrowed from Engels and to be quite Marxist.

Nevertheless.... One notices the amazing coincidence between the scenarios chosen as most acceptable by the authors and the major political aims of the imperialist

states. One notices the fact that both in the first and in the second report the social aspects of the problems analysed are ignored. Yet without this the superb and emotionally presented recommendations of the authors acquire a clear gloss of utopianism.

In order to offer a social analysis of the problems one must, naturally, clarify their sources and the reasons for the tension that has arisen, its antecedents, one must lay bare the social and economic sources of the crisis situations with whose solution the world is wrestling. But both the first report to the Club of Rome and the second report, which has a much stronger political accent, have overlooked them. Is this not because these sources lie in private property-owning social relations and in the historical practices of antagonistic social formations? The further continuance of such practices will bring mankind to the verge of catastrophe. But the authors of both reports try to see solutions to the problems in the framework of precisely those social conditions which in fact were the reason for the emergence of today's ecological crisis.

Can one secure "organic growth" in the conditions of capitalism, especially today, when contradictions are growing both between the advanced capitalist countries and between the advanced and developing countries? The energy crisis has very convincingly demonstrated that the well-known principle of imperialism "grab your neighbour by the throat" remains in force. Each of the imperialist beasts of prey tries to utilise above all in his own interests even that uniting of efforts in particular fields which is dictated by iron necessity.

Mesarovic and Pestel nevertheless tried to touch upon this aspect. Their report contains quite a few observations that the time has come to create a new economic order, when international frontiers should be virtually open ones and each region make a contribution to world

advance that would be in its own interests as well as in the interests of all mankind, that new norms of material consumption and even a new life style should be formulated, and so forth. But the question as to how all this can be achieved remains unanswered.

More precisely, an answer is offered but it seems to take mankind back to the era of utopian socialism whose exponents, seeing the vices in the society of their day, proposed getting rid of them by means of criticism and the preaching of lofty ideals, since they were unable to find the social force capable of becoming the creator of a new society.* In a similar way all the recommendations of the authors of the second report mainly boil down to establishing a new system of education oriented to the twenty-first century, to the study of mankind and of the experience of all humanity. In itself this is an important and interesting proposal but is it sufficient to solve global problems? I think not. For only changes in the material conditions in which conflict situations between the world of man and the world of nature arise, changes in the social and economic, political and ideological-moral bases of an antagonistic society can offer a real possibility of harmonising the development of the "human society-nature" system. Without this the most attractive scenarios and conclusions of the report remain something like a wonderful dream, awakening a response and exciting people, but remaining only a dream.

It is precisely this air of utopianism in the conclusions and recommendations of Mesarovic and Pestel that, evidently, explains the circumstance that their report, which is much more interesting, fundamental and optimistic than Dennis Meadows' *The Limits to Growth*, aroused considerably less public interest. Scientific and public circles in the Western countries, having "digested"

* V.I. Lenin, *Collected Works*, Vol. 19, p. 27.

the pessimism of *The Limits to Growth*, took *Mankind at the Turning Point* at first as an alternative to the first report. But they found in it the same hopeless pessimism under already familiar recommendations: one of Alvin Toffler's basic proposals was also for introducing "instruction for the future" at schools and universities, in the press, on radio and television and thus preparing to meet the future.

One has the impression that interest in the forecasts which the Club of Rome brought to the notice of world public opinion is rapidly waning in the West. *The Limits to Growth* shared the fate of *Future Shock*: a great fuss, many translations, then only rare mentions in the scientific press. *Mankind at the Turning Point*, perhaps partly because of a certain complexity, received much more modest acknowledgement. The third report *Renewing the International Order*, prepared by Nobel Prize winner Jan Tinbergen, aroused even less interest.*

Yet Tinbergen's report is an extremely significant publication. Above all because in effect it admits the dubiousness of the forecasts which were made in the first and second reports. According to Tinbergen no reliable data yet exist for a correct forecast of the key processes of world development. The tolerable limits of the agricultural transformation of the biosphere are unknown and so one cannot forecast the growth of food production. It is hard to say how the world's requirements of energy and raw materials should be met. It is not clear how to combine the interests of the advanced and the developing countries, how to draft supra-national solutions, how to organise co-operation between the industrial countries and the developing countries, and so forth. In other words, there is no reliable basis for

* J. Tinbergen, *RJO: Renewing the International Order, Draft of a Project* 1974.

making serious judgements about the very processes on which the authors of the previous reports to the Club of Rome focussed their attention.

The third report puts the quest for a solution of global problems on another plane. Tinbergen's group lays the emphasis on proposals for establishing a new world social and economic order. It is, as they say, getting warmer, almost hot. But Tinbergen's new international order, alas, in effect contains nothing new. The third report to the Club of Rome also starts out from the possibility of changing the mode of action of the modern capitalist state, without altering its essence, of solving outward contradictions while preserving the inner, determining ones.

Tinbergen proposed evolving machinery for taking decisions and creating forms and organs of international control which would secure a way out of crisis situations. Among immediate tasks he lists the redistribution of income between "rich" and "poor" countries, the introduction of a world income tax and a tax on the utilisation of natural resources, international efforts to expand education and science in the developing countries, the increasing of exports from these countries and other measures. He proposes determining the optimal contribution of each country or region to the development of global production, the drafting of steps to regulate the birth rate, more careful assessing of the possibilities of using surplus labour resources and so forth.

As may be seen, much of this is either a continuation of the previous reports or a borrowing from them. But the same question arises: how are these tasks to be fulfilled? In Tinbergen's view, the way is fairly simple. Supra-national organs must be set up taking decisions by majority vote, they should be given the right to make recommendations and also to use compulsion—and all the problems could be solved. His report suggests that

such supra-national organs could be set up for redistributing scientific research resources, for regulating world markets, especially the raw material markets and for revising the foreign currency and financial system. Naturally, all discriminatory trade barriers and restrictions should be removed, and protectionism and the use of force excluded from politics.

The political naiveté of many tenets of the third report is evident. One can, of course, establish world banks, world organisations for energy and natural resources, for food, for capital investment, and for science and technology and any other kind of organisation. But for these organisations, bodies and institutions to serve the purpose for which they were created something much more than the measures Tinbergen proposes is needed. It is after all a question of today's national states voluntarily surrendering a goodly share of their own sovereign rights. That is the first point.

Secondly, the third report, like the first two, nevertheless bears the imprint of the habit the developed countries have of putting their own interests first. The developing countries are expected to accept the solutions prepared for them. Yet many former colonial and dependent states have already irrevocably set out upon their own paths and view with legitimate distrust the recommendations and proposals that are foisted upon them. It is right to pose the question of the redistribution of natural resources but one must above all bear in mind that the developing countries have a sovereign right to a considerable portion of these resources. And they have no less, if not greater grounds for putting forward a counter-proposal, let us say, for redistributing the accumulated wealth and industrial capacities concentrated in the Western countries. And why not? Are not natural resources, with the exception of international ones, also a national possession, like capital, factories

and transport?

The most important and general conclusion from the three above-mentioned reports is that their authors, having inventorised the tense situation that has arisen, leave us in effect no better off than at the start. Proposing to glance at future problems, they do not propose to glance at the future society and they by-pass the heart of the question. And the heart of it is that one can alter the character and organisation of man's relations with nature only by altering the organisation of people themselves. The authors of all three reports in one form or another admit that social and political problems lie behind their econometry and the natural scientific and technological problems of the ecological crisis, but they do not dare to heed their real significance. This circumstance lends their models a technocratic, Messianic and utopian flavour, it makes them yet one more contribution to the "apocalyptic" trend in futurology. Incapable of proposing any more or less real solution to the problems they have disclosed, the forecasters of the Club of Rome are forced to appeal to the goodwill and "conscience" of states and to engage in constructing moral bridges to the future. The importance and usefulness of such constructions are shown by the rapid waning of broad public interest in the above-mentioned programmes.

While noting all these factors, it would be wrong, however, to write off completely the conclusions and importance of the three reports to the Club of Rome. Analysing them, one cannot but feel profound respect for the humanist standpoints of their authors and welcome the noble quest of scientists concerned for the future destinies of mankind. And although it is clear that the Meadows group, and Mesarovic and Pestel, and Tinbergen in constructing their global models largely take their own personal views and set of values as a starting-point, these reports cannot be erased from the

history of the struggle for bringing harmony into the relations between the world of man and the world of nature. While their most important conclusions were spurned or disputed, these reports were the first practical demonstration that modern science is capable of analysing the state of the "world of man—world of nature" system as a whole. They have had a very powerful impact on the world scientific community, prompting new quests for solutions to ecological problems, they have drawn fresh forces into these quests and have made people think seriously about the strategy of mankind's interaction with nature. And although, as has already been noted in Chapter II, these reports are quite effectively being made use of by capitalist theoreticians, this does not nullify and cannot nullify their importance.

One cannot fail to note yet another interesting feature of these reports, one which touched capitalist society on the raw and did damage to the outlook of private property ownership. Upon close analysis all three prove to contain a striking criticism of the capitalist utilisation of nature, they show the consequences to which the capitalist path of development could lead mankind. The cancerous growth of the chaotically developing capitalist economy, extrapolated to the future, shows that the pragmatic and narrowly utilitarian standpoint of capitalism is too shaky a base for one to be able to build the future upon it.

I think it was precisely this aspect of the studies made at the request of the Club of Rome that swiftly prompted other forecasts quite at variance with the estimates of the authors of these three reports, although they also based themselves on the experience of capitalist society. These new forecasts were not so argumentative, they did not cause a great fuss but they contain a considerable theoretical and mental thrust.

The title of Jerome Tuccille's book, *Who's Afraid of*

1984? *The Case for Optimism in Looking Ahead to the 1980s* (New York, 1975), speaks for itself, for instance. The author was so fed up of the word crisis that he decided on his own to support the optimistic mood of mankind. Going with a critical toothcomb over the technocratic, demographic, Malthusian and ecological forecasts, Tuccille draws a simply fantastic picture of how the world will be saved by ... the multi-national corporations!

This is indeed something new in futurology. And after him it is quite natural to find observations to the effect that in the 'eighties evolution will have successfully replaced revolution, that the entire population of the United States will have become a "leisured class", everybody without exception will have become optimists, will have abolished compulsory education and become tolerant, and so forth. The discoverers of new lands as well as private airlines will have set off for the Moon, rest homes will be built on Neptune, the secret of the process of aging will have been discovered. And, evidently, only people visiting towns, that have now become museums, will recall the finalist, pessimistic forecasts of old. Here, as they say, all problems have been solved.

Deserving of closer and more serious study is the forecast by the well-known "Soviet expert" Herman Kahn, director of the Hudson Institute (US), who has not begun to calculate what will be happening in 25-30 years' time, but has looked two centuries ahead straightaway.*

His estimates are radically at variance with those of the Club of Rome. Mankind, thinks Kahn, has no basis for anxiety because in the next two centuries the material aspect of his life will considerably improve. It is simply that twentieth century man has greatly exaggerated his own capacity to do harm to the environment and

* *Scientist*, August 3, 1976.

has underestimated his own adaptability. Vast areas of the Earth will, of course, still remain poor even in two centuries' time, but this will be only relative poverty. The population will stabilise at 15,000 million and less energy will be used than now. The Earth will be slightly overheated, the pack ice will melt, Siberia and Canada will have new arable land, science will halt the deserts and so forth. As a result, Kahn affirms, the Earth's resources will more than suffice for ensuring for an unlimited period ahead that level of population and economic development which his forecast envisages. Any doubts that his forecast may be inaccurate are, evidently, not entertained.

The Hudson Institute's treatment of the problem very seriously and consistently stresses the social aspects. There is enough of everything in the world, Kahn maintains. The only thing people lack is money. If consumers could pay, then there would be no way halting growth. But how is one to increase the purchasing power of the population of, say, the developing countries? For this the developed, rich countries must encourage immigration on a permanent or temporary basis (and this while there is permanent unemployment in the West!). Apart from this the United States should "export half its industry" to the developing countries (not as a gift, of course!). The consequence of all this would be that even those countries whose per capita production is now 100 times less than that of the United States would by the year 2076 be producing only five times less per head of population than the United States. No doubt Kahn thinks this the most favourable percentage relationship for social welfare.

Life in the world of the future will become more mechanistic. Culture will acquire more consumer features. Science will oust the emotions. Individualism will grow. There will be greater tolerance of violence. Mass

production will completely oust the handicrafts. The nuclear stalemate must be maintained as a guarantee against major wars. The richer countries will spurn anything that smacks of world government (this is a response to Tinbergen's proposal), because in such a government they would have a minority of votes (prosperity will not, it seems, be universal nevertheless). International corporations will gather in an ever richer world harvest from the "green revolution" and so on.

It would be no exaggeration to describe Kahn's forecast as crude and superficial. He views the future through the prism of today's American stereotypes of force, of the leading role of the United States and of the consumer mentality. Not just the trends of growth of the modern world but growth itself is extrapolated into the future with the aim of affirming the immutability of the present alignment of forces, the correctness of imperialist policy and the everlasting character of the United States' leading role in the capitalist world. And from this point of view an optimistic forecast appears as the most pessimistic. The consideration of social aspects proves to be just a device for affirming the immutability of the social *status quo* of the modern world and for affirming the programme of those imperialist circles whose imperative rule is maximum growth and consumption. Kahn's report is the revelation of an apologist for existing capitalist reality, it is a political tract on ecological themes.

Unfortunately the more serious forecasts made by authoritative scientists take as their starting point what limits mankind and not what increases its powers. The method of their studies is based on the weakness, not the strength, of the world of man, it is based on heeding the harmful, not the positive, factors. Naturally, the extrapolation and hypertrophy of these factors produces giant magnitudes in the future, which exceed the possibilities of mankind that we can conceive of today. This has

led to the fact that most of the forecasts must be counted among those gloomy prophecies which have accompanied the entire history of mankind, according to which mankind should have vanished from the face of the Earth a thousand times already. Nobody is going to minimise the importance of the scientific facts cited in support of these contemporary forecasts—it is precisely these facts that create the illusion that the forecasts are reliable. But one must remember another thing: to the people of past centuries those prophecies, made at particular stages of human history, which today appear ridiculous, at the time appeared absolutely authentic. Thousands upon thousands of people were convinced they were true and went out into the city squares to await “the end of the world”. Day followed day, year followed year and ever more complex situations arose, new woes and ills, yet mankind grew steadily in numbers and strength despite everything. And in this very movement, in the irresistible historical process of the development of man, in his unswerving and irreversible advance to ever higher stages of social organisation, herein, I think, lies the solution of conflict situations and the source of bringing into harmony the relations between the world of man and the world of nature.

*Expanding and swift, henceforth,
Elements, breeds, adjustments, turbulent, quick and
audacious,
A world primal again, vistas of glory incessant and
branching,
A new race dominating previous ones and grander far,
with new contests,
New politics, new literatures and religions, new
inventions
and arts. **

* Walt Whitman, *Leaves of Grass*, p. 22.

VIII. "LAWS WHICH FORM LIFE'S BONDS"

Then
With what prudence,
Just spirit and the tact
Of concordance unseen,
With what great daring and genius exact
We'll have to scrutinise the basic laws
Which form life's bonds and worlds together
draw...
Serene and simple, powerful and right
Man in the circus of familiar forces
Shall organise then his adventurous life...

Emile Verhaeren

Acquaintance with the forecasts of historical advance along "ecological lines" prompts us to ask fundamental questions: Did man really appear under Earth's blue sky simply in order to plunder and destroy his planet and then vanish without trace in the depths of Time, having proved the erroneousness of nature's experiment in endowing with reason the human being it created? Or will man be able to go out into space and start to journey from one planet to another, leaving behind barren wastes, thereby elevating today's writers of science fiction to the rank of prophets? Isn't there really a more optimistic forecast than this? The first two questions virtually add up to the third one, but to answer it one must, as the saying goes, dot all the "i"s.

"Man is evolution become aware of itself", a naturalist has said figuratively and absolutely correctly. But surely this consciousness has some consequence for evolution and has become something in it? It has. It has become management. The evolution of world nature has increasingly proved to be manageable evolution.

And in what direction is the management centre, which has emerged from thousands of millions of nature's trials and errors, guiding her? If we adopt the standpoint of finalism, then whether we like it or not we are forced to conclude, firstly, that the self-awareness of evolution in the shape of man is an error on nature's part and, secondly, that as a consequence of this error the biosphere will inevitably become a necrosphere—a sphere of lifelessness. In general:

*Absurdity grows like a fatal flower
Upon the mould of feeling, heart and brain.
No heroes, no new saviours remain;
And in our native reason here we wallow.**

Obviously, such a prospect hardly suits mankind. One must check thoroughly to see if there is any other path, let us say, into space, if there is any possibility for earth-dwellers to become, for instance, Barnardists (the Barnard star has been found to have a planetary system, as is well known) or something else. Man's entry into space, the automatic laboratories functioning on other planets, the creation of artificial products and materials, the use of a source of energy outside the biosphere—the energy of the atom—all this is convincing testimony to the very great freedom which man has gained in his battle with nature. But the link between the achievements of the genius of man and notions about the possibility of people breaking away from their native planet and becoming independent of the Earth's biosphere, has been presented and is upheld so far only by the writers of science fiction. In actual fact everything is much more complicated.

A book was recently published in the Soviet Union by Professor V.I. Yazdovsky, who is studying problems

* Emile Verhaeren, *Poèmes*, p. 43.

of supporting life during space flights. The book contains simplified diagrams of the life-supporting systems aboard the *Gemini*, *Apollo*, *Vostok* and *Soyuz* spaceships. These simplified, amazingly complex systems show better than words that the spatial detachment of man from the biosphere is not essentially a separation from it. On the biological plane man remains as before a being wholly dependent upon the conditions of the biosphere.

Yes, man is today entering space. But in what environment is he living and working in space? In an earthly one. He breathes the air of Earth, eats earthly food, drinks earthly water, creates Earth's atmospheric pressure in his spaceships and spacesuits. His body functions as it does on Earth. He takes a "piece of the biosphere" with him and supports his life in it. And maybe it is precisely the breakthrough into space that will help us to appreciate the significance and farsightedness of the words spoken by the great Soviet scientist V.I. Vernadsky: "As living matter mankind is inseparably bound up with the material and energy processes of a particular geological mantle of the Earth—with its biosphere. It cannot for one minute be physically independent of it."*

Not so obvious is the fact that even an inorganic terrestrial substance also "longs for its native planet". Although Spinoza had already formulated his postulate of the constancy of the laws of nature, when he wrote that nature's "laws and rules, in conformity with which everything takes place and changes from form to form, are everywhere and always the same",** and although later

* V.I. Vernadsky, *The Chemical Structure of the Earth's Biosphere and of Its Surroundings*, Moscow, 1965, p. 324 (in Russian).

** B. Spinoza, *Ethics* (Great books of the Western World), Chicago-London-Toronto-Geneva, 1952, p. 395.

this postulate was confirmed by physicists, in particular by Maxwell, nevertheless the forms in which these "laws and rules" manifest themselves and the limits of their operation vary extremely in different circumstances. In other words, the transformation of one and the same substance, say, on the planets of two stellar systems will proceed according to identical laws, while the results of the process may be totally different.

That is why man, sending his instruments and apparatus to other planets and into space, is often forced to ensure for them operating conditions close to those on Earth—pressure, humidity, temperature and the gaseous composition of the air. This is inevitable because the instrument or apparatus was built and graded on Earth and transmits data which can be understood only in comparison with data about the Earth. It is made of Earth-found materials whose properties, which to a considerable degree determine the way the instrument or apparatus functions, have been ascertained by man in earthly conditions. An inanimate object can, of course, exist longer than a living creature away from the biosphere, the destructive, stabilising or restorative action of whose components was taken into account by man in making that object, but eventually it too ceases to exist *as something from Earth*. "Every mineral can exist unchanged only so long as it lies in the conditions of its formation. The moment it leaves them, it enters upon a new stage of its existence.... The simple transfer of a mineral from one field to another prompts in it changes and a regrouping corresponding to the new conditions."* For this reason, who can tell what may happen to the material from which the mooncraft, the Venus probes and other apparatus were so successfully made,

* V.I. Vernadsky, *Selected Works*, Vol. 2, Moscow, 1955, pp. 21, 40 (in Russian).

after prolonged exposure to non-earth conditions, what new qualities they may acquire and what qualities known to man they may lose? One thing is beyond doubt: in any part of the Universe nature will immediately set to work to transform an "alien" body in conformity with the conditions that prevail wherever this "alien" body lands. Terrestrial technology is undoubtedly able to perform definite operations in extra-terrestrial conditions, but how long can it exist in those conditions? Its existence, like that of man, is also evidently linked with the conditions of the biosphere.

As a biological species, being, despite all his capacity to adapt himself, unadapted for life and work in space and, in general, in ecologically alien environments, man finds himself in a paradoxical situation. Even when he moves to settle on other planets he will hardly be able to break away from earthly conditions unless, of course, he finds a planet identical to Earth or else he himself changes in conformity with the new environment.

Such a change is, evidently, theoretically possible and many forecasts have been made on this point, but it should be remembered that the adaptation of a complex living organism (and man is undoubtedly the most complex organism now existing in the conditions of Earth) to a fundamentally different environment requires an extremely long period of time, even if such a change is consciously controlled and directed and its result can be guaranteed with a sufficiently high degree of assurance. Meanwhile all the indications are that even on the most distant journeys man will have to take with himself his native biosphere—the environment of his existence, and this environment will always fence him off from other worlds. For this reason, however attractive it may be to imagine, as Arthur Clarke does, that our fair Earth is only a place for briefly stopping-off on our journey from the world ocean, where we were born

to the starry ocean to which we are now aspiring, Earth will nevertheless always remain with man, accompanying him on the stellar routes he chooses.

Why do I think it necessary to lay particular emphasis on and to reveal as broadly as possible this unceasing bond of ours with Earth's natural environment, its biosphere, which has given birth to us and reared us? Because to ignore the character of this bond is to provide a breeding ground for the false optimism which is no better, if not worse, than finalist views.

Indeed, if man can sooner or later become independent of his vital origins, why should he be so concerned for his native planet? We have already entered space, we know that other planetary systems exist and that in pursuit of light and space mankind may break away from the solar system and perhaps even go beyond our galaxy. In the face of these breath-taking accomplishments of the future, our earthly problems appear, to put it frankly, rather petty. And, as we appeal to the future, we start making plans to replace Earth's natural biosphere with a technosphere constructed by man's hands and brain, and we foster in our hearts the hope that somewhere a kindly unspoilt planet awaits us, to which we shall move, leaving on Earth our great sins and errors, our cruelty and shortsightedness.

But alas! The laws of nature are everywhere the same. And, basing their views on these laws, scientists with the aid of the queen of science—mathematics—have proved that in any case only an insignificant portion of mankind will be able to leave the Earth. The Earth is our home and will remain so for ever! Mankind will seek the light of truth and new learning beyond its boundaries. This quest will become an inexhaustible stimulus to human activity, which is already in itself the equal of the greatest of discoveries. But man will not, I think, succeed in finding a new home for the whole of mankind

beyond the confines of the Earth. Perhaps herein lies the tragedy of man, perhaps herein lies his good fortune, but the house in which we have lived so long must be preserved, it must be carefully repaired, embellished in good taste, kept clean and in good order. And even if at some future date the road to the stars be a boundlessly broad one accessible to all men, man will still have to leave his own planet in complete order, having weeded all the baobabs, like the Little Prince in Antoine de Saint-Exupéry's story, and dusted in all the corners.

The creation of artificial materials and products is, of course, a great victory of man and an enormous success in his eternal struggle with nature. But it is by no means a step away from nature. Firstly, because these artificially created materials are in one way or another linked with their natural sources; "artificial" means only that the particular material is not found in nature in such a form; synthetic materials made from casing-head gas are in some ways just as "natural" as, let us say, stainless steel. All artificial things have their roots in nature. And, secondly, one should not forget the purpose of artificial materials and products. By using them to replace particular food or technological resources, man is above all striving to preserve the stability of his living conditions—the conditions of the biosphere. There was no need to produce artificial beefsteaks or caviar as long as there was an abundance of beef and fish. People did not wear artificial furs as long as there were sufficient natural furs. Despite the immense importance of artificial products and materials for the life of mankind today, they are, evidently, nevertheless testimony to the poverty and not the wealth of mankind. They are created to replace a particular component of the natural resources, copying its qualities and properties as a rule. The replacement of the resources of the biosphere does not mean a replacing of the conditions of the biosphere.

Theoretically, of course, one could replace all the components of the biosphere with artificial ones and create a man-made biosphere. Many scientists have already considered such a course. Some accept it and call for the speediest possible transformation of the biosphere into a technosphere, which would be managed with confidence—that is to say, at a new level, of course, they have returned to the views of Descartes. Other scientists have reasonably remarked on the instability and unreliability of artificial systems, their high consumption of energy and the lack of sufficient knowledge for radical reconstruction of the biosphere. I think the latter are right.

The biosphere is the film of life, the totality of the living substance of the planet. This living substance of the Earth is a unique and almost omnipresent compound described by the empirically found chemical formula $H_{2960}O_{1480}C_{1480}N_{16}P_{1.8}S$. Its synthesis is the most complex of all the amazing chemical processes that have ever occurred and it is the most delicate operation in which man has ever intervened.

All this goes to show that there is not and cannot yet be any independence of the human organism from earthly conditions. This means that the whole historical development of society, the entire advance of mankind and its future must be examined in inseparable unity with the development and the future of the natural environment of our planet. The conquest of nature, mastery of it, “independence” of it are achieved only upon the invariable condition that in conquering nature man himself submits to it, in mastering it he himself finds himself subordinated to it, and becoming independent of it he finds himself ever more dependent upon it.

It is precisely in this aspect that one must examine the prospects of man's existence on the planet which has reared him! A fundamental flaw in the method of the

forecasts I have cited lies in the fact that they perceive nature as something totally passive, unresponding, so immobile that the changes mankind has made in its system may be equated with purely mechanical changes. But such a point of view was rejected as long ago as in Hegel's day! In the "nature-society" system both parties are active, although undoubtedly the forms in which they manifest their activity are very different. The contradiction between them is a dialectical contradiction. It is no accident that Engels stressed: "It is ... from the history of nature and human society that the laws of dialectics are abstracted. For they are nothing but the most general laws of these two aspects of historical development, as well as of thought itself."*

If we take nature, human society and thought in their inseparable dialectical totality, heeding their mutual influence and dependence, then we shall have to admit that not only the world of man but also the world of nature is steadily advancing through qualitatively new and ever higher stages. The appearance of man on Earth was in itself such a stage. Nature gained consciousness and rose by thousands of millions of strides from the very simple organisms which were also in their time an advance from inanimate nature, to the vertebrates, to the species *Homo sapiens*, to human society.

For this reason it is quite logical to suppose that the gigantic unfolding of human forces, the mass of human achievements in consciously transforming the environment, the "explosion" of scientific and technological thought—that all this, in the first place, has, in one way or another, been prepared for by the whole past evolution of earthly nature and the whole history of the biosphere and, secondly, is the threshold of a new qualitative leap in the development of nature. Moreover there

* Frederick Engels, *Dialectics of Nature*, p. 62.

arises here something like a double new quality: whereas previously the qualitative changes in the development of the biosphere were the product and result of its own evolution, now, for the first time, it is, by the efforts of man and his activities, rising to a higher stage. And the whole path of the development of nature and society is a pledge that this new stage will not be a necrosphere.

What then might it be?

Many years ago V. I. Vernadsky envisaged the possibility and inevitability of the transition of the biosphere to a qualitatively new state. He called this the state of the noosphere, the sphere of reason.

For justice sake it should be stated that the term "noosphere" is not Vernadsky's. It was brought into wide scientific use by Pierre Teilhard de Chardin, who in turn borrowed the term from the French Bergsonian philosopher Edouard Le Roy. But both Le Roy and Pierre Teilhard de Chardin heard V. I. Vernadsky lecturing in Paris in the twenties, were acquainted with his views and were to some extent influenced by him.

Pierre Teilhard de Chardin, who is an idealist, a Jesuit, an eminent palaeontologist and anthropologist, saw the noosphere as an ideal formation, as a "layer of thought" round our planet. "A glow ripples outward from the first spark of conscious reflection. The point of ignition grows larger. The fire spreads in ever widening circles till finally the whole planet is covered with incandescence. Only one interpretation, only one name can be found worthy of this grand phenomenon. Much more coherent and just as extensive as any preceding layer, it is really a new layer, the 'thinking layer', which, since its germination at the end of the Tertiary period, has spread over and above the world of plants and animals. In other words, outside and above the biosphere there is the

noosphere.”*

This is a very interesting and exquisite attempt to express the biosphere radiant with the flame of reason! But what is meant by “outside and above the biosphere”? Reason and consciousness outside their material bearers? A stream of information, as some thinkers later interpreted the noosphere?

V. I. Vernadsky gave a fundamentally different meaning to the notion of the “noosphere”. In his view it was the material layer of the Earth, changing under the impact of man. “Mankind, taken as a whole, is becoming a powerful geological force. And mankind, its thought and labour, are facing the problem of reorganising the biosphere in the interests of freely thinking mankind as a single whole... The noosphere is a new geological phenomenon on our planet.”**

Vernadsky’s noosphere is not a “layer of thought” spreading round our planet outside of the biosphere. It is a stage in the development of our planet itself, a development that embraces absolutely everything and which is most strikingly expressed in the qualitative changes in the Earth’s most dynamic, its “youngest” layer—its biosphere. The world of man, becoming “the sole agent of its kind” in the biosphere, is with ever increasing speed changing the structure of the very foundations of the biosphere, securing and determining its transition into the noosphere. This transition is being accomplished not outside the boundaries of the biosphere, not from one planetary layer to another, but within the biosphere, as a transition from one of its states, from one tension to another, higher one. V. I. Vernadsky many times emphasised this, noting that the noosphere was a state of the

* Pierre Teilhard de Chardin, *The Phenomenon of Man*, Harper, New York, 1965, p. 182.

** V. I. Vernadsky, *The Chemical Structure of the Earth’s Biosphere and of Its Surroundings*, p. 328.

biosphere, "a new state of the biosphere". That is to say, the noosphere is the biosphere in a particular state, at a definite level of its advance, moreover it is man that raises the biosphere to this state. Man, who is the focal point of the "maximally effective energy" concentrated in the biosphere,* becomes its mighty driving force, the most striking embodiment of and stimulus to its changes, and he is seen to be "a great geological, perhaps even cosmic force".**

The very profound and most striking optimism of the concept of the noosphere has its mainsprings above all in human activity itself. The noosphere is its result. And inasmuch as this activity, as is well known, is a process that is not only constant but also growing, the process of the forming of the noosphere is also irresistible and constant. Speaking of production, Marx and Engels concluded that it was "an historical act, a fundamental condition of all history, which today, as thousands of years ago, must daily and hourly be fulfilled",*** which cannot be ceased even for a minute and is of an objective character. This may be applied in general to the whole of human activity. Through the life of human society nature gains ever new, additional possibilities of its own boundless development.

*Sage, hero, artist, apostle, venturer
Breach the black wall of mystery each in turn
And, thanks to these men's lone or joint endeavours,
The new man feels he is the Universe. *****

* Ibid., p. 34.

** V.I. Vernadsky, *Biogeochemical Essays*, Moscow-Leningrad, 1940, p. 47 (in Russian).

*** Karl Marx, Frederick Engels, *Collected Works*, Vol. 5, p. 42.

**** Emile Verhaeren, *Les villes tentaculaires*, Paris, 1924, p. 210.

Of course, man himself changes too. Moreover he is the first to change. It is above all in man himself that the progress of the biosphere is realised. Influencing external nature and changing it, man—a creature of the biosphere and part of it—changes his own self and his own nature, he continually develops. This development in turn intensifies the impact of man on the material world around him, it calls to life ever new forces in nature and subordinates the play of these forces to the power of reason. And man cannot halt this process otherwise than by ceasing to be man and by ceasing to exist as man. “The more man becomes man, the less will he be prepared to move except towards that which is interminably and indestructibly new. Some ‘absolute’ is implied in the very play of his operative activity,”* wrote Pierre Teilhard de Chardin. This “absolute” is not merely hidden in man—it is a law of the existence of all nature, it is its eternal and indestructible movement, the eternal advance from lower to higher that is inherent both in the world of man and in the world of nature.

The keen eyes of geniuses saw this great movement. Karl Marx often stressed that social progress is a process of natural history, that he viewed “the evolution of the economic formation of society ... as a process of natural history”.** V.I. Vernadsky also noted that the laws of the cultural growth of mankind are very closely bound up with the grandiose processes of nature and cannot be regarded as accidental. “The direction of this growth—toward the further seizure of the forces of nature and their reworking by consciousness and thought—has been determined by the course of the *geological* history of our planet. It cannot be halted by our will.”***

* Pierre Teilhard de Chardin, *The Phenomenon of Man*, pp. 231-32.

** Karl Marx, *Capital*, Vol. 1, p. 21.

*** V.I. Vernadsky, *Biogeochemical Essays*, p. 44.

But it can be accelerated by our will! The more conscious is man's control of his activity, the higher the degree of organisation of this activity, the more farsighted and manifold the approach to it, ever the fuller and wider are the possibilities of development and boundless the number of its manifestations. I think that only in the light of this eternal development of nature—taking into account its acceleration by man—can one understand mankind as a geological force that is ever increasing. It is in this sense that human society becomes the sole agent of its kind in the biosphere, transforming it into the noosphere.

It is true that at this point objections and new questions arise. If the noosphere is a state of the biosphere, it must then be limited by the boundaries of the latter. What then about near space, where there are hundreds of products of intelligent human activity—rockets, satellites and spaceships? How about the penetration by man and by man-made technology into the under layers of the mantle of the Earth? And how about man's utilisation of a source of energy outside the biosphere—atomic energy? All this is beyond the bounds of the biosphere, but all these are surely elements of the noosphere. What then are we to do about the concept—"the noosphere is a state of the biosphere"?

The noosphere is indeed not bounded by the biosphere. It enters space, probes the depths of the Earth, breaks through to other planets. But it enters, probes and breaks through because man, the creator and exponent of the noosphere, when he passes beyond the bounds of the biosphere, does not cease to be a creature belonging to it. Flying to other planets, he takes earthly conditions along with him, as has already been noted. An automatic space probe also "takes" along similar conditions. In other words, the noosphere, like man, cannot break away from the biosphere. The satellites and probes, which have become dead metal in the ex-

panses of space, are convincing proof of this. These are just "attempts of the biosphere" to extend its bounds, made by man, the principal driving force of its development into the noosphere.

Now as to the source of energy outside the biosphere. The point is that man, strictly speaking, has always used energy outside the biosphere. Everything he had at his disposal and utilised to support life, he took from the Sun. The biosphere only accumulated energy for him in one form or another at the Sun's expense. This situation has not changed today either, but the Sun's energy alone is not enough for man now, he has begun to utilise the energy of the atom. But this is evidence of attempts consciously to regulate a most important natural process and it once again stresses the advance of the biosphere to the level of the noosphere. Vernadsky said outright that the creation of the noosphere would make man seek new sources of energy. He regarded the discovery of atomic energy as a colossal step towards creating the noosphere.

And now the last point. The objective character of the emergence of the noosphere—does this offer grounds for not worrying about the future? The process is underway in any case, the movement is eternal and indestructible, so is it worth our while bothering today with solutions to various problems and struggling for justice against a world of private property and its practices, is it worth our while defending the environment and so forth? In other words, is not the conception of the noosphere a fatalist conception?

V. I. Vernadsky wrote that "in the geological history of the biosphere an immense future is opening up before man, *if he realises this and does not use his reason and labour for self-destruction*".* [Italics mine—I.L.]. Man

* V. I. Vernadsky, *The Chemical Structure of the Earth's Biosphere and of Its Surroundings*, p. 327.

can realise this and cease to turn his own labour and reason against himself only in the conditions of a just society, a society based on communist principles. This seems indisputable. The creation of such a society over the whole of our planet will be evidence not only of a high level of development of the productive forces of man, but also of his unity, of the "collectivisation" of his reason. This will be a decisive condition for the transition from the biosphere to the noosphere.

So you see what a splendid aspect of the theory of the noosphere is here revealed! The introduction of harmony into the relations between society and nature is determined by social progress. The noosphere, as a natural achievement of the history of relations between the world of man and the world of nature, requires, V. I. Vernadsky thought, "mankind's manifestation as a single whole", and "corresponds to the unity and equality of all men".* But these are communist ideas, the ideals of scientific communism! V. I. Vernadsky, who became acquainted with Marxism in the thirties, when his views on the noosphere had already been published in the main, arrived at communist ideas following the path of a naturalist and natural scientist. He provided, as it were, a natural science argument for communism. The noosphere and communism emerge as two aspects of the process of natural history: the noosphere reflects this process in nature, communism—in society. In other words, the noosphere is the only possible state of the natural, physical basis of communism, the degree of man's mastery and control of the environment in which *Homo sapiens* exists at the stage of communist formation, while communism, in its turn, is the only possible social form in which this degree is attainable. Let us recall that, according to Marx, "for the socialist man the

* Ibid., p. 328.

entire so-called history of the world is ... the emergence of nature for man", while communism is "the *genuine* resolution of the conflict between man and nature and between man and man...". Marx considered that "the entire movement of history", the whole process in natural history of the emergence of human society is "its [communism's] *actual* act of genesis". * The understanding of history as an objective process found splendid confirmation in Vernadsky's view of the unity of all men as a law of nature. "I use the concept 'law of nature' here," he wrote, "as it is now increasingly entering into our lives in the field of the physical and chemical sciences, as a precisely established empirical generalisation."***

"Hitherto historians, and scholars of the humanities in general, have deliberately not reckoned with the laws of the nature of the biosphere, where only life can exist.... In fact there is *not a single living* organism on Earth that exists in a free state."*** [Italics mine—*I.L.*] V. I. Vernadsky, evidently, had not had the occasion to read Marx's *Economic and Philosophical Manuscripts of 1844*, which brings us to virtually the same conclusion obtained by the method not of natural science but of philosophy and history: "That man's physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature."****

Of exceptional interest is what Marx wrote in a letter to Engels, commenting on a book by Fraas, *Climate and the Vegetable World Throughout the Ages, a History of Both*: "The conclusion is that cultivation when in prog-

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 3, pp. 296, 297, 305.

** V.I. Vernadsky, *The Chemical Structure of the Earth's Biosphere and of Its Surroundings*, p. 328.

*** Ibid., p. 324.

**** Karl Marx, Frederick Engels, *Collected Works*, Vol. 3, p. 276.

resses spontaneously and is not *consciously controlled* (as a bourgeois he, of course, does not arrive at this), leaves deserts behind it—Persia, Mesopotamia, etc., Greece. Here again socialist tendencies without being aware of them! ...”^{*} This remark virtually anticipates the idea of the noosphere as the unity of two trends—the socialisation of society and the progress of its interaction with nature, an interaction which can be successful only if there is conscious control and direction.

The theory of the noosphere enabled V. I. Vernadsky to form quite a definite picture of the future of our planet and of society. He wrote that at the present time under the influence of the horrors of life that surrounded us one often heard talk of the coming barbarism, of the collapse of civilisation and of the self-destruction of mankind. These moods and judgements he regarded as issuing from an insufficiently profound grasp of what lay around one. He thought that the actual situation in our time could not permit the growth and victory of the forces of barbarism which seemed to be prominent now. He thought that the philistine fear of the possible collapse of civilisation was bound up with an underestimation of the strength and depth of the geological process such as was represented by the transition of the biosphere to the noosphere now being experienced. V. I. Vernadsky believed that from the viewpoint of the noosphere it was objectively and lawfully to be expected that the splendid new future of mankind would be born. His belief finds confirmation in Marx. According to Marx too the movement of society was controlled by laws which were not only independent of man’s will, consciousness and intentions, but themselves too to a decisive degree determined man’s will, consciousness and

^{*} Karl Marx and Frederick Engels, *Selected Correspondence*, Moscow, 1975, p. 190.

intentions.

It is important to note also the specific understanding of man's mastery of nature under communism from the viewpoint of the noosphere. In characterising the essence of man's power over nature, Engels formulated his standpoint precisely: "All our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly."* An examination of the processes occurring in nature in the light of the noosphere necessarily brought Vernadsky to a Marxist understanding of the mastery of nature. Not its crushing under the "iron heel of industry", nor arbitrary interference in the system of its links actuated by private-property-owning interests, nor the constructing of new landscapes according to the free play of human intelligence, but careful and loving control of nature's most powerful forces, a control based upon a fundamental knowledge of its laws. The path to social freedom and to the new might of mankind is not a path to man's freedom from nature. The creation of a communist society is the creation of a society which "is the complete unity of man with nature—the true resurrection of nature—the accomplished naturalism of man and the accomplished humanism of nature".**

Building his future and his new world, learning the great secrets of his "inorganic body" and turning his knowledge into a direct productive force, man is outliving the child's passion for remaking and "conquering" nature and is learning to use the forces of nature precisely as natural forces, and not as conquered, transformed ones. Production based on such a mastery of the external world reveals man to himself not as "a featherless

* Frederick Engels, *Dialectics of Nature*, p. 180.

** Karl Marx, Frederick Engels, *Collected Works*, Vol. 3, p. 298.

two-legged creature" or as "a tool-making animal", seeking with these tools to crush and lord it over nature, but as nature's highest creation and, by virtue of this, nature's real creator, as the summit of natural history, the apex of a pyramid whose foundation man must continually safeguard and strengthen so as to scale new heights and develop further. The problem of the relations between society and nature is ever more fully seen to be a problem of man too. The knowledge of nature cannot be sufficiently integral, profound and adequate if man is removed from it and counterposed to it, nor can the knowledge of man be so if nature, as something alien, dead and subordinate, is counterposed to man.

For this reason one may conclude that the present period is not just a period of the practical expansion of man's consumption of nature, but also a period of his union with nature and with all the social problems that issue from this. By his activities man is profoundly transforming his environment, and this transformation will be adequate to human nature only if there is a human understanding and knowledge of nature. But for this man must grasp the secrets of his social life and organise it in such a way that the development of the relations between society and nature is achieved with broad consideration of the long-term consequences, that is to say man must establish a society that corresponds to his might. Herein lies the source of historical optimism in determining the prospects for the development of the "world of man-world of nature" system. Only such a society will enable man to heed the limits of the possible in nature, and not solely his own ends. V. I. Vernadsky pointed out that the formation of the noosphere emerges like the "natural substratum of the historical process". One may evidently with full justification presuppose the contrary too: social progress is the social substratum of the noosphere; its formation presupposes

a society of such perfection that it would enable man to organise and implement a really rational attitude to nature.

So we see revealed before us in a new light one of the main contradictions of our age, and a new opportunity appears of precisely tracing the sole objective possibility of solving it. Communism thus shows us yet another aspect of its historic mission—the salvation not only of man but of nature also. This has already been proved in practice. The transition of society to the first phase of communism has convincingly affirmed that the new society creates new relations between man and nature, raising them to the level of conscious, long-term control, regarding them as a “vital, communist cause”.*

*The sun and stars that float in the open air,
The apple-shaped earth and we upon it,
surely the drift of them is something grand,
I do not know what it is except that it is grand,
and that it is happiness,
And that the enclosing purport of us here is not a
speculation or bon-mot or reconnaissance,
And that it is not something which by luck may
turn out well for us,
and without luck must be a failure for us,
And not something which may yet be retracted in
a certain contingency.***

* L.I. Brezhnev, *Following Lenin's Course*, Speeches and Articles, Moscow, 1972, p. 35.

** Walt Whitman, *Leaves of Grass*, p. 174.

IX. NATURE AND MORALITY

I believe a leaf of grass is no less than the jour-
ney-work of the stars.
And the pismire is equally perfect, and a grain of
sand, and the egg of the wren,
And the tree-toad is a chef-d'oeuvre for the highest,
And the running blackberry would adorn the parlors of
heaven,
And the narrowest hinge in my hand puts to scorn all
machinery,
And the cow crunching with depress'd head surpasses
any statue,
And a mouse is miracle enough to stagger sextilli-
ons of infidels.

Walt Whitman

Albert Schweitzer defined ethics as unlimited responsibility for every living thing. In his view a sense of reverence for life is the basis of moral consciousness and gives rise to the willingness for self-abnegation for the sake of life, for the sake of all life. "Man becomes more moral ... because he hears ever louder the voice of ethics, because he is possessed by an ever stronger desire to preserve and further life."* Schweitzer recognised the inevitability of doing harm to some life or other and drew from this the conclusion that there must be some sort of atonement. "When I help an insect to escape from harm, I am thereby only trying to minimise the guilt that man bears in relation to another living creature. Where an animal is forced to serve man, each of us should take care to reduce the suffering it undergoes for man's sake. None of us has the right to pass by sufferings

* Albert Schweitzer, *Kultur und Ethik*, Munich, 1960, p. 340.

which are not specifically our responsibility, and to fail to avert them. No one should console himself here with the thought that he should allegedly be compelled to meddle in matters which do not concern him. No one should close his eyes and ignore sufferings he has not seen. No one should lighten his own burden of responsibility.”*

What Schweitzer says is all the more attractive because this wonderful person himself spent his whole life in rare conformity with ethical principles. But nevertheless one must admit that his all-embracing, universal reverence for life is rather scholastic, since unlimited responsibility is, in point of fact, a synonym for irresponsibility, a substitute—and far from one of equal value—for the principle of an attentive and thoughtful attitude to the world around us. For there is no clear boundary between what “lives” and is considered alive and what does not come under this heading. For nature is a single system in which the cruelty of the beast of prey is as necessary a component as the meekness of the dove.

In other words, reverence for life does not accord with the laws of development of life itself. And if one were to adopt Schweitzer’s standpoint, man would prove to be a focal point of evil, a creature continually doing evil. Morality would come into irreconcilable conflict with necessity, including the necessity existing in nature itself, and man would either have to be raised like a god above his biological essence or would be doomed to the impossibility of attaining happiness because of being under the eternal curse to cut short some other life.

Schweitzer’s conception undoubtedly accords with man’s subjective intentions always to prefer good to evil and to be generous, compassionate and just. But then

* Albert Schweitzer, *Kultur und Ethik*, p. 341.

what are we to do with nature, which throughout the whole of his history man has been actively and creatively transforming, infringing upon the lives of other creatures for the sake of his own human life? Engels noted, in particular, the beneficial influence which the eating of meat had upon man becoming man and thus upon the whole of our history. As a result the human brain received "a far richer flow of the materials necessary for its nourishment and development, and which, therefore, could develop more rapidly and perfectly from generation to generation. With all due respect to the vegetarians man did not come into existence without a meat diet..."* And this food was, understandably, obtained by sacrificing the lives of "our lesser brothers". Alas, our fair thoughts of today about reverence for life stand upon a centuries-old foundation of the extermination of other creatures, and not even the stone of cannibalism can be thrown out from this foundation.

The ethic of infinite reverence for life is evidently just as hopeless as the ethic that denies the value of non-human life. They are two extremes from which it is hardly possible to extract a positive view, having practical meaning, of man's moral attitude to nature.

In its time ethics had already experienced these two extremes. Rejecting them, it had chosen its own, ethical centre of the world. Such a centre is man in the full complexity of his bonds with society and nature.

The social aspect of the "nature-society" problem has stepped up interest in these bonds and in their moral and ethical features. The sphere of what is strictly moral has broadened and this is quite a normal development. Man's theoretical and practical relations with the natural environment of his existence are, as has already been noted, mainly not direct ones but indirect—through

* Frederick Engels, *Dialectics of Nature*, p. 176.

other people, through bonds and relations with other people. Upon the character, type and quality of these bonds depend both the character, type and quality of man's relations with the surrounding world and his understanding of this world. In order to produce, wrote Marx, men "enter into definite connections and relations with one another and *only within these social connections and relations does their relation with nature ... take place*".* [Italics mine.—I.L.]. And since we are dealing with social relations, the criteria of the notion of morality are here just as relevant as in any other sphere of social life.

The moral aspect of the "nature-society" problem may be seen with particular distinctness from the viewpoint of the development of man himself. The world is reflected in man. There is a profound inherent unity between the wealth of the natural environment and the wealth of human sensibility. The world of man is also the world of the environment surrounding him. And man's attitude to it must therefore of necessity be among the categories that have a moral substance.

Here, by the way, there is virtually nothing new. Such an approach has been moulded in the course of history. The affirmation of such features of human personality as kindness, a desire to help the weak, and compassion of necessity had to manifest themselves in the nature-forming activities of social man. And it is by no means accidental, not from a sense of pure compassion that collective reason has always come out against senseless cruelty and a rapacious attitude to nature, affirming love of nature.

All the more urgent has such an approach become today in the conditions of the scientific and technologi-

* Karl Marx, Frederick Engels, *Collected Works*, Vol. 9, Moscow, 1977, p. 211.

cal revolution and of mankind's social renewal. The unprecedented growth of human possibilities, the violation—as a result of man's production activities—of the normal course of nature's processes, the exhaustion of certain natural resources—all this extends the bounds of man's responsibility to nature and makes him concern himself not just with "his own garden" but with the planet as a whole.

Thus the relationship with nature is a social relationship. But in the practical sense it is of necessity moulded from the specific daily actions of all the members of society. In one way or another, directly or indirectly the aim of these actions is the transformation and consumption of the material of nature, for man at every level of the development of society lives upon nature and draws from it all the means of his existence. And the burden of traditions, a burden augmented by the shortcomings of education and by personal irresponsibility, by the imperfection of technology and the lack of knowledge, affects the perception of nature by each individual, just as it affects social attitudes towards the surrounding world.

Man is counterposed to nature in at least two aspects. First of all he "represents" society before nature, giving effect in his activities to the purposes and aims of society. He is guided by social interests and transforms the world around him in accordance with these *particular* interests and *his understanding of them*. If social interests figure in a distorted form—let us say, private-property-owning interests are masked as society's interests—then, of course, even the most highly moral individual will contribute his share to the immoral destruction of nature, for it is impossible for the individual's relation to nature to improve *despite society*.

When society's interests are precisely formulated in the form of a scientifically grounded task, when the implementation of this task is not in the least fraught

with inescapable harm to the environment, the individual can make his contribution to securing society's interests in such a way that it leads to the damaging of nature. Some adverse occurrences in the socialist utilisation of nature are caused precisely by elementary failure to understand that sometimes resources allocated for building purification plants are not used due to the ignorance of an official, that the incorrect organisation of land improvement operations, the acceptance of water and wind erosion as ordinary occurrences, the over-felling of forests and the generous granting of land for non-agricultural use, lead to the impoverishment of nature, and that the overwhelming majority of such instances are not prompted by social requirements.

It is no secret that sometimes objective circumstances force an individual to harm the environment: there is, for instance, no possibility with the present level of science of guaranteeing the hundred per cent purification of sewage and effluent; what seems to be a normally well-considered project reveals in the course of execution that it may cause environmental pollution; the power station needed to serve a vast region bars the way of fish to its breeding grounds, leads to the loss of considerable areas of fertile land, and so forth. Appreciating the significance and size of the wounds he inflicts upon nature, man is nevertheless *compelled* to act as he does. This is in general inevitable, it has always been and always will be so, because man, as has already been noted, has always definitely infringed upon the "living matter" of the planet for the sake of his own life. But the important thing is that he should realise this and not overstep the bounds of real necessity in sacrificing some portion of nature's eternal capital wealth for the sake of the vital interests of society. Such an understanding frees the individual, who is correctly aware of the objective interests of society, from charges of an immoral atti-

tude towards nature, even when some damage is done to it.

It is, of course, extremely difficult to evolve such an understanding. What can a person be guided by in taking his decisions if a purely economic or technological evaluation proves to be insufficient, if even concern for society's interests may here sometimes suggest the taking of steps that are not the very best?

Well, what guides us when we come to the defence of another person? It is evidently not only and not simply our kinship with him, but also the firmly established notion that we *ought* to behave in this and no other way. What guides us when we preserve something we ourselves have made and which belongs to us or simply has some significance for us? It is evidently the awareness of the usefulness and importance of this particular thing for our own vital activity, as well as of our own participation in the making of it; we sense a genetic bond of some sort with the labour materialised in it. What guides us when we take care to preserve works of art, man-made beauty? It is evidently the feeling of pleasure and the joy beauty arouses in us when we contemplate it.

But it is nature that unites all this in itself! It is akin to us, for it is also we ourselves. For human life it means incomparably more than any object, any building made by the labour of man. It embraces all the beauty, particles of which, reflected in works of art, are so dear to us. It is the source of our joy and of our whole life, the field of our eternal quests and discoveries, of our happiness and health.

*Me imperturbe, standing at ease in Nature,
Master of all or mistress of all, aplomb in the midst of
irrational things,
Imbued as they, passive, receptive, silent as they,*

*Finding my occupation, poverty, notoriety,
foibles, crimes,
les important than I thought...**

It is such an understanding of the universal general significance of nature for the development of any society and for the life of each person, and the elevation of nature to one of the highest places in the system of social and personal values and priorities, which, I think, can become a factor enabling man to take a sensible measure of the necessity and possibility of infringing upon nature for the sake of society's interests.

But the individual appears before the world of nature not just as a representative of his own society but also "in his own right" when he strives for his own personal interests and for the sake of those personal interests influences the environment in a particular way. He may influence it to good effect, when his understanding of the world correctly reflects the significance and value of nature, and when he is striving to safeguard it as truly his own "inorganic body". Such an approach corresponds to the interests of the whole of mankind, as well as to the objective interests of society, and here the individual acts from the standpoint of morality both in relation to society and in relation to nature. But another approach is found when in the utilisation and protection of nature man is in effect counterposed to society, counterposing his personal interests to those of society and appearing as the squanderer of nature's riches. Such a man strives to acquire and consume some portion of the common possession, doing harm both to society and to nature.

This phenomenon is most strikingly seen in the capitalist countries. "The corporate world—every pressure group—is always looking for means of avoiding or

* Walt Whitman, *Leaves of Grass*, p. 10.

even evading environmental regulation What we do marks a moral or ethical decline,"* sadly notes William O. Douglas, who has brought together in his book very striking examples of the stubborn struggle of private interests against society's interests, a struggle in which nature is the silent victim but one that mankind is very sensible of.

Something similar arises at times in socialist conditions too. I have in mind poaching which constitutes an extremely immoral attitude on the part of the person involved towards nature and society, it is a form of brazen and outright robbery of the people. Socialist laws strictly punish such people but this is the amazing thing: many of them are quite convinced that the criteria of morality used in judging their actions have no sense whatever. It turns out that elementary moral norms are as yet regarded not by everybody as the factor determining their attitudes towards the world of nature. Some people still "raise" themselves above the sinful Earth and stride over it like Atilla. It is a challenge not so much to nature as to society, for the poacher's activities are an outright flouting of socialist laws.

In socialist conditions, of course, such phenomena cannot survive long and will soon be thoroughly outlived. But this does not make them any the less dangerous because they are bound up with a grossly wilful attitude to the world, with ignorant consumption of its wealth and with a low level of moral culture. While a man who has not cultivated in himself a moral attitude to the surrounding world, a relationship in which superiority over the rest of nature is used by men not to crush but to exalt nature and to realise in full measure nature's humanism and one's own naturalism—such a

* William O. Douglas, *The Three Hundred Year War*, pp. 10, 14.

man will strive only to "consume" nature. We will preserve for the future much greater wealth and opportunities for progress if already today each person understands that the future will receive after us not only productive power, a social order and a certain spiritual heritage, but also the natural foundation for further social progress. Upon the state in which our contemporaries leave this foundation the life of people in the future shall depend to a decisive degree. Our actions today in one way or another predetermine the Earth's future flourishing, the happiness and welfare of its citizens and the existence of all mankind. In this sense our moral responsibility for preserving the world of nature emerges as truly unlimited.

All this poses in a new way the problem of man's moral education, of training him to look at the world around him with new eyes, with the eyes not of a constant rival, but of an assiduous master who understands that he will gain power over nature exactly to the extent that he subordinates himself to it. In such training a decisive role should, undoubtedly, be played by mass education on problems of the utilisation and protection of nature. For this reason it is a cause for particular satisfaction that in the Soviet Union and other socialist countries both schools and universities are extensively spreading environmental knowledge and are introducing special and optional courses on studying the fundamentals of the science of the biosphere. Even the nature diaries which schoolchildren in the junior forms keep every day, are of no little value in this respect. Problems of the utilisation of nature have begun to receive more attention from writers and artists, newspapers, films, radio and television. An atmosphere of heightened attention to nature is being created in the socialist countries.

A truly human attitude to nature is not, of course,

moulded simply by precepts, books and pictures. The ability to be a sensible master of the surrounding world is being fostered, like all the other features of personality, above all by other people, by their practical actions and attitudes to nature. We all influence the behaviour of our kin by our own behaviour and influence their morality by our own morality. We are all in some respect each other's teachers and mentors.

In this connection I recall a small green oasis somewhere in a remote part of Turkmenia, about thirty or forty kilometres from the nearest habitation. I well remember an old Turkman a not very tall man, a former brigade leader of cotton-pickers, with such an understanding of and feeling for the soil that he gave all the rest of his life to the earth, creating single-handed this little oasis. Anyone who has been only once in those parts knows what is involved in obtaining the sapling of a green tree, in watering it and protecting it from the sun. And probably nobody will ever know how much toil, stubbornness and courage it cost this old man to level and clear the earth, dig a well, make a small irrigation system and regularly water his saplings.

Soon the green island at the roadside could be seen from afar. And every car and lorry would stop nearby. People would get out either to drink water or simply to look at the trees growing there. And everybody thought they had always grown there. The old man was quietly digging there and nobody would pay any attention to him. He was not offended. He had created this little island and the green of the trees, and the wonder and joy of the travellers pausing to rest there were the best reward he could wish for. If only each one of us possessed only a little of his understanding and love of nature!

From the viewpoint of morality the scientist represents his society before nature in a special way. And

And not only because he is always in the forefront of the relations of the world of man to the world of nature and is, as it were, an embodiment of the great might of human reason. The scientist largely determines the forms of man's practical and theoretical relations with nature and the norms by which we are guided in our behaviour.

It is precisely the results achieved in the development of science, which is the scientist's sphere of activity, that enable society to substantiate its tasks and aims most precisely and to outline the effective ways of realising them which will also be least harmful to nature. Placed at the service of man and used for noble purposes, science is today opening up unprecedentedly broad and promising prospects for bringing the relations between man and nature into harmony. New forms of energy and new methods of using it, new materials and new possibilities of working them, new food products and new ways of obtaining them—all this must be regarded as the material basis for changing man's relations with nature, the basis for his new view of it and his better understanding of its manifold and never fading values.

Showing to man the inexhaustible "inventiveness" of nature, revealing new forces in the biosphere and new ways of using these forces, science persuades the world of man of the fundamental necessity and, if you like, the advantageousness of harmonising relations with nature. At the same time it becomes increasingly clear that many of our present technological processes cause society losses counted in centuries for the sake of gains of a single day.

At the same time, while noting the outstanding role of science and scientists in bringing the relations of society and nature into harmony, and in creating the fundamental possibility of new relations of man to the natural environment of his life, let us recall that human activity, as a result of which the present ecological

tension has arisen, was also scientifically based. It was precisely science that put forward and substantiated the principles of "remaking nature", that largely determined and co-ordinated the practices of utilising nature and offered the public notions of man's interaction with nature which from the vantage point of our times appear to be certainly mistaken.

The incorrect recommendations of science were, of course, based on objective circumstances. Above all the secrets of nature had not been probed deeply enough, the level of knowledge about nature was low and there were society's urgent needs, which did not allow long studies to be conducted and which confronted scientists with the task of getting results at least cost and with maximum speed. All this is well known, understandable and explicable. But nor is it a secret that many scientific proposals were and are dictated by not only these objective factors but also by the unique "self-assurance" of science, or, more precisely, of those engaged in science, and even by their personal aspirations to exploit a particular set of circumstances. Such actions are immoral both in relation to society and in relation to nature and we are fully justified in applying to "scientists" of that kind Marx' remarks about "base people" engaged in science for short-term personal gains.

The complexity of the scientist's position and the magnitude of his moral responsibility are also determined by the fact that by his activities and their results he definitely moulds the world outlook of social man, himself later falling a "prisoner" to this world outlook. Not infrequently a scientist offering some "super-project" to the public does—perhaps without noticing it himself—lay a new foundation for the view of nature as a testing-ground where the wisdom of all-mighty man can conduct experiments. Carried away by the power of materialised human knowledge and by the brilliance of

their own ideas, scientists "instil" ideas into public opinion, each idea more grandiose than the preceding one: tomorrow we will melt the Arctic ice, separate two oceans by a dam, change the climate of Antarctica, or enclose the solar system in a special sphere. But the most important and most moral question—will the implementation of such projects turn out in the last resort to be good or bad for mankind? —is not, as a rule, examined by their authors.

The most striking example of unusual intellectual recklessness in approaching the world of nature are the illusions of today's unbounded faith in technology, the conviction that technology will rework nature in the best possible way, is "bringing order" into it and adapting it to man. Such a conviction fosters notions of the technological transformation of the biosphere, of the construction of an artificial biosphere, and of the technological regulation of the environment. The main thing in such conceptions is that the properties, qualities and functions of the biosphere are, as it were, projected onto the means which man has created and which have become the intermediary between society and nature, and it is from this point of view that the future of nature and the future of man are considered. This gives rise to a kind of neo-Cartesianism, to attempts to interpret the biosphere as some sort of giant machine which can be controlled as simply as a machine. And it is no accident that, though still half science fiction, not so very infrequent descriptions appear of the technological reconstruction and improvement of the human body.

I think notions of the "technisation" of the biosphere call for a very careful and cautious approach. Each of them requires painstaking evaluation above all from the standpoint of the future, from the moral standpoint. And not just because these conceptions are accompanied by the danger of pushing the biosphere by means of

technological transformations beyond the limits needed for the normal functioning of the human body. But also because even the theoretical elaboration of these notions becomes an obstacle to bringing the relations of nature and society into harmony. For they egg man on to the idea that he should, without any necessity, "usurp" particular functions from nature, they persuade him that he and his technological installations will be able to fulfil this function better than nature itself, and they more often than not lead to grave consequences in the utilisation of nature. For nature is seen in them as something separate from the human body, while the possibilities of transforming the environment can be objectively assessed only when one takes into account the biological needs of man himself and the adaptation possibilities of the biosphere. Such notions willy-nilly bear the mark of the primacy of technology in relation to man.

Academician S.S. Shvarts, director of the Institute of Plant and Animal Ecology of the Urals science centre of the USSR Academy of Sciences, very precisely formulated how man should transform the environment. The point is not how to keep nature untouched—this is impossible, all the more so because already long ago there ceased to be any untouched, virgin nature on our planet, it has all been subject in greater or lesser degree to the influence of man. The point is that by utilising the immense possibilities of nature itself and the laws of its development to raise the biological productivity of the biosphere and create on this basis an optimal natural environment—biocenoses capable of self-regulation in a world that has been changed and is being changed by man.

This scientist particularly noted the specific features of solving biological problems and the inapplicability of a purely technological approach. People often hold the view that they must either subdue or help nature—but

not that they must co-operate with it. The example of forest parks shows very convincingly that when nature becomes a "dependent" of man, it no longer "wishes" to look after itself, that the man-created forests require continual expenditure to support and revive the saplings, that these may occupy former forest areas but their biological nature are beyond any comparison with the former "natural" forests. Man ought not to assume the functions of the biosphere, but should alleviate its hard work counting on its "wisdom" and inner strength. Relations based on trust—in that way and that way alone should we interact with nature. This would also signify a truly moral attitude to it on the part of man.

Such an attitude is undoubtedly determined by one's world outlook as a whole, just as our notions of the world and of man's place in it determine the ideological and moral standpoints upon which people build their practical plans. Morality is not something separate from one's world outlook, it is an inseparable part of it. Metaphysical explanations of the world are of necessity bound up with the crudely utilitarian consumption of nature, with the pursuit of an immediate effect, and with lack of concern for what influence the area destroyed may have on neighbouring areas and on the whole planet. The dialectical principles of the unity and counteraction of society and nature and an orientation towards social and long-term interests should also dictate concern for the state of the whole planet and for the vitality of each area of it.

For this reason it was no accident that precisely in the period of the emergence of a new society and the triumph of the dialectical world outlook that "man for the first time realised that he was a planet-dweller and could—should—think and act in a new aspect, not just in the aspect of an individual person, a family or clan, state or union of states, but in a planetary aspect"

(V. I. Vernadsky).

Capitalist social science has reacted in its own way to the necessity of thinking and acting in a planetary aspect. A range of notions has appeared of the moulding of "mankind's ecological consciousness", of "ecological ethics", of "bio-ethics" and even of "ecological religion". At the same time, as if to offset those notions, there has been a sharp livening of interest in discussing man's "eternal curse" to do evil, of the biological basis for his amorality and immorality, accusations against natural science and technology have been stepped up, and so forth. Demands have been put forward for humanising the sciences and for working out political solutions to the most important problems of society, such as health and environmental pollution.

The bankruptcy, contradictoriness and even reactionary character of many of these notions and demands is obvious. But it is also obvious that in their totality they reflect a definite turning-point in the character of the capitalist world outlook, a chaotic quest for a conception of the world based on a moral attitude towards nature, taking account of the geographical, ecological, economic and political aspects of man's existence on the planet Earth, and reflecting in a different way from the present the factor of time as well as man's responsibility to future generations. In other words, a conception of the world taking as its starting-point the principle of the unity of man and nature.

Bourgeois social thought cannot, of course, "notice" the basic fact that a new attitude to the world presupposes in the first place new forms of man's "mastery" of this world. For whatever part of the Earth man, a group of men or a nation is master of, they are masters of a part of what is the possession of all mankind—Earth's nature. They cannot and should not be owners of their realms. Speaking of the land brought under cultivation

Marx noted: "Even a whole society, a nation, or even all simultaneously existing societies taken together, are not the owners of the globe. They are only its possessors, its usufructuaries, and like *boni patres familias*, they must hand it down to succeeding generations in an improved condition."* I think these remarks may be applied to the whole of our planet today. The Earth and its nature are the property of the whole of historically having existed, existing and coming mankind.

Responsibility to the future and a heeding of the time factor should make people take a long-term estimate of today's utilisation of nature. Hitherto each generation on our planet has strived to pass on to its descendants nature developed to the utmost and turned into material wealth. Mankind has had unshakable faith in the gratitude the future will bear it.... But immense problems and losses have also remained for subsequent generations: the spread of deserts, the disappearance of valuable species of animals and the destructive onset of erosion on almost continental scale. Yet this is the result of the activities of man possessing only relatively simple tools, at any rate, nothing comparable with those men have been given by the scientific and technological revolution of today!

The new attitude to the world presupposes also a new view of itself by mankind, a view not through the prism of "mine" but through the prism of "man's". And to evolve such a view is to put an end to the immoral practice whereby at one end of our planet nature's wealth and man's talents are spent on manufacturing luxuries while at the other there is acute illness, hunger and poverty, when all the best and most valuable things which man has created and which nature has offered him are turned in the first place against man in the form of

* Karl Marx, *Capital*, Vol. III, Moscow, 1974, p. 776.

various means of destruction, and when men behave amid nature according to the principle "après moi le déluge". It is not very intelligent to suppose that men will always remain separated, divided into groups, enclosed within the narrow bounds of frontiers and prejudices. When these bounds are broken, men will be able to turn their free gaze to the whole of Earth and the more its riches are preserved the more secure will be the foundation of the future prospering of mankind and its planet.

A moral attitude to the world of earthly nature should have immense influence on the notions of the role of man and his reason in the Universe, notions which have for so long been reduced to elementary anthropocentrism. "If man is the centre of the Universe, then it is natural for him to set his own personal interests above everything else, without being embarrassed even by the multiplicity of such 'centres'," wrote Academician N.G. Kholodny, a pupil and follower of V.I. Vernadsky. As may be seen, what appear to be purely theoretical notions emerge as the basis not just of separate practical actions but of the whole of man's vital activities. If *Homo sapiens* is the centre of Creation, it means he is above everything else, everything else is under him, he is a creature qualitatively different from all the rest, so his planet is also a centre, and so forth.

Having analysed the sources of anthropocentrism, the colossal harm done to both nature and man as a result of this world outlook and also the new achievements of science and social progress, Academician Kholodny drew the conclusion that in science, in the arts, in morality, in social and political relations—everywhere we observe the gradual waning of anthropocentrism with all its derivatives and the shoots of a new world view are everywhere breaking through. He called this new world view anthropocosmism.

The new understanding of the world does not, of course, simply or of its own accord assert itself in all its aspects, fully and completely. The physical law of inertia does not extend to such non-material "things" as convictions, notions and habits, but it sometimes seems that it is precisely here, in the spiritual sphere, the inertia is greatest and most noticeable. For this reason it may happen that something which life itself has rejected and uncrowned, something which everyone acknowledges to be useless and, what is the main thing, unnecessary, continues to live on in the minds and behaviour of certain people.

One involuntarily thinks of the "law" of this nonmaterial inertia when considering moral attitudes towards nature. Such "inertia" does not wane straightaway. Overcoming it takes more than a day and more than a year. But it is a task which is absolutely necessary for all who live on Earth. In the era when mankind is making the historical transition to communism and when the materialised forces of human knowledge are already comparable with the forces of nature, it becomes vitally necessary for man's intellectual powers and his moral qualities to develop in unison with his technological powers. Mastering and inhabiting the whole planet, breaking out into space, turning production processes from simple processes of labour into increasingly science-based processes which place at the service of human needs not just the properties of natural materials and the substances of nature, but nature's processes themselves, making ever greater use of science as a direct productive force, man must be prepared for the sensible application of his great achievements. A moral attitude towards the surrounding world is evidence of such preparedness, it is a practical expression of his awareness of the unity of the world of man with the world of nature that surrounds him.

*Melange my own, the unseen and the seen,
Mysterious ocean where the streams empty,
Prophetic spirit of materials shifting and flickering
around me,
Living beings, identities now doubtless near us
in the air that we know not of,
Contact daily and hourly that will not release me,
These selecting, these in hints demanded of me.**

* Walt Whitman, *Leaves of Grass*, p. 18.

X. FOR THE SAKE OF FUTURE AND PROGRESS

Come, I will make the continent indissoluble,
I will make the most splendid race the sun ever shone
upon,
I will make divine magnetic lands,
With the love of comrades,
With the life-long love of comrades.

Walt Whitman

In seeking solutions to the ecological problems that have arisen as a side-effect of historical development, the gaze of mankind is ever more often turned to the new world. Socialism ever more convincingly reveals its advantages in man's interaction with the environment and figures as a kind of global model of the nature utilisation of the future. Socialist society removes the *social causes* that prompt the irrational utilisation of natural riches and the destruction of the environment.

Common ownership by all the people of the means of production and of the land, of its minerals, waters, forests, and of its animal and plant world, remove in principle the basis for irrational use of natural resources and their spoliation. The direction of the production process and control of the state of natural resources, and of the environment as a whole, are concentrated in one pair of hands—the hands of the people. That is the first point. Secondly, the humanist character of the socialist state's social aims exercises an ever greater influence on the organisation of the utilisation of nature. All for man, all for the sake of man—this call, which imbues the

whole life of socialist society, is of universal significance. It is for man and for the sake of man that socialist society preserves and restores nature, and safeguards its beauties. The manifold bonds between man's health, his mood and capacity for work and the state of the environment, that is to say, the importance of nature as a source of satisfying man's spiritual needs and as a major factor of wellbeing, is at the focus of attention of the socialist state. In other words, its humanist aims—improving the material and spiritual life of the people and moulding a man of all-round development—organically include the most careful and far-sighted attitude of society towards nature.

Thirdly, there is the planned development of the national economy. Behind this simple and very ordinary phrase, if we examine it from the viewpoint of ecology, there lie possibilities of colossal importance. They include the possibility of co-ordinating the growth of industry and agriculture and the distribution of people in accordance with nature's scientifically established potential. There is the determining of the prospects, volume and rate of consumption of natural resources. There is the planning of the effectiveness of the tapping of resources, that is to say, the elucidating of losses of natural resources per unit of production output and the reduction of such losses. There is the co-ordination of the "exchange of matter with nature", taking account not only of how much one can and must take from nature, but also of how much one should return to it. There is control of the process of urbanisation, at least, of its most important part—urban construction, the development of cities on the basis of general plans. There is, lastly, the ending of the competition between resources, the shifting from one resource to another according to the state of the market, the ensuring of a comprehensive approach to the tapping of natural

resources, and much else.

All the present-day activities of the socialist state in environmental protection, all the utilisation of nature under socialism is a practical implementation of Lenin's ideas. Lenin regarded the shaping of a thrifty and responsible attitude towards natural resources as one of the most important conditions for the building of the new society.

In the very tense days of the struggle for Soviet rule Lenin paid constant attention to evolving a socialist approach to nature. Thus in April 1918 in his "Injunctions to All Soviets" he drew attention to the need to plant forests on denuded lands. Soon afterwards Lenin and Sverdlov signed a decree "On Forests", which played an outstanding role in organising the conservation of nature in the Soviet Union. Then there followed the decree "On a Central Committee for Preservation of Water Resources", a joint decree of the People's Commissariats for Internal Affairs and for Health "On Conservation of Green Areas (gardens, parks, suburban forests and other green vegetation)", the decree "On the Preservation of Natural Monuments, Parks and Gardens", and other decisions.

The outline of a plan for scientific and technological work occupies a special place among the documents, numbering almost one hundred, relating to nature conservation and utilisation, signed by Lenin during the period he was Chairman of the Council of People's Commissars. Today, from the vantage point of our times, the draft can be seen as the foundation for the entire development of Soviet science. For the first time the task of making an extensive and urgent study of the country's natural wealth was posed on a state scale. That is to say, for the first time conditions were created for really bringing order into the utilisation of nature. And it must be said frankly that no other country had seen nature

studies and surveys accomplished on such a scale and with such speed as in the first decades of the Soviet Union's existence.

Characteristic was the fact the new system of utilisation of nature was at once drawn up with regard for problems of protecting the health of the population. The programme of the Communist Party, adopted immediately after the October Socialist Revolution, stated the need for "the resolute carrying through of extensive health measures in the interests of the working people, such as: a) making inhabited localities more healthy (protection of the soil, water and air)"...* This line of action was continued and developed in the further policy of the Communist Party of the Soviet Union, which pays great attention to the protection and rational utilisation of forest, water and other natural resources, and to their restoration and increase.

The Soviet state has been and is implementing its ecological policy consistently and purposefully. The early years of the building of socialism, and the consequences of economic devastation and the civil war did not, of course, give broad scope for conducting nature conservation measures. But it was precisely in this period that the most important nature reserves were established in the Soviet Union. It was precisely in this period that the ways of opening up new territories and of constructional developments in the North virtually took shape. There was a rapid growth of the mining industry and of power station construction. It was precisely in these years that the first attempts were made at the comprehensive tapping of natural resources and the foundations were laid on the protection and restoration of animal species that were vanishing. Elk, sable, otter, forest marten, saiga and other animals which are today the

* V.I. Lenin, *Collected Works*, Vol. 38, p. 445 (in Russian).

object of normal trapping, are living testimony to the effectiveness of the ecological policy of the new society.

Another point should also be stressed. The system of utilisation of nature established in the early years of Soviet rule opened up to the Soviet Union the possibility of making swift and all-round economic advance and of strengthening its defence capacity. The independence of the national economy was secured in respect not only of basic materials and foodstuffs but also of virtually all kinds of industrial raw material. This enabled the Soviet state to save both material resources and time, and to achieve a level of development of science and technology, of the economy and defence that made possible the victorious repelling of the aggression of German imperialism.

The war dealt enormous damage to Soviet society and the country's natural environment. The damage was both direct, as when the fascists ruthlessly felled timber, appropriated mineral ores and destroyed biocenoses, cultivated landscapes and the established systems of the utilisation of nature, and also indirect, as when the Soviet Union's efforts were directed towards restoring the national economy, providing shelter and food for hundreds of thousands, for millions of people and when, consequently, one had inevitably to limit the funds and labour force allocated to nature conservation.

It will forever remain greatly to the credit of the Communist Party and the Soviet Government that even in such difficult conditions they found it possible to pay attention to the natural environment. Suffice it to recall the decree of the Central Committee of the Communist Party of the Soviet Union and of the Council of Ministers of the USSR "On the Plan for Field-Protective Afforestation" (1948) and the great scale of operations that began in implementation of that plan. This project showed once again that nature will indeed repay a hundredfold care taken for it and to help it. The forest

shelter belts, extending for thousands of kilometres over the lands of the Volga region, North Caucasus and the Central Black-Earth Zone "functioned" silently and unnoticed. The increase in crop yields of 1-3 centners per hectare, which the plantings ensure, is indeed not so very great, nor it is so small as to be left out of account. But then the winter of 1969 came, a winter with very strong, it seemed, even unprecedented dust storms. And the forest shelter belts proved to be true and reliable protectors of the land. The fields protected by them suffered very little or not at all.

The sixties and the early seventies saw exceptionally energetic measures being taken to improve land use. One may say that it was precisely during this period that the countrywide system of nature conservation was established and its legal and organisational machinery took shape. Legal measures that were drawn up and passed were the Fundamentals of Land Legislation of the USSR and Union Republics (1968), the Fundamentals of Legislation on Health Protection (1969), the Fundamentals of Water Legislation (1970) and the Fundamentals of Legislation on Mineral Wealth (1975). Two decisions of the Central Committee of the Communist Party of the Soviet Union and of the Council of Ministers of the USSR were taken on protection of Lake Baikal. A major contribution to Soviet legislation aimed at nature conservation was made by the decree of the Central Committee of the Communist Party of the Soviet Union and of the Soviet Government of 29 December, 1972, "On Stepping Up the Protection of Nature and Improving the Utilisation of Natural Resources" and the documents of the Fourth Session of the USSR Supreme Soviet, Eighth Convocation, held in September 1972. Laws on nature conservation have been drafted and passed in all 15 Union republics. Since 1974 plans for nature conservation have been an inseparable

part of all economic programmes and this is a major step towards the full integration of nature conservation within the general process of economic activity. Socialist society is in actual practice seeing to it that present and future generations should enjoy all the benefits which the splendid Soviet homeland offers its people.

In the Soviet Union the humanist principle of nature conservation and the rational utilisation of natural resources is enshrined in the Constitution. Article 18 of the new Constitution of the USSR (1977) states: "In the interests of the present and future generations, the necessary steps are taken in the USSR to protect and make scientific, rational use of the land and its mineral and water resources, and the plant and animal kingdoms, to preserve the purity of air and water, ensure reproduction of natural wealth, and improve the human environment."

The resolutions of the 25th Congress of the Communist Party of the Soviet Union are of invaluable significance for the further introduction of harmony into the utilisation of nature. The consistency of the Party's policy in this very important sphere has found embodiment in the fact that the drawing up and implementation of measures to protect the environment and the rational utilisation and reproduction of natural resources have been listed in the Soviet Union among the basic tasks of the development of the economy in the period from 1976 to 1980 too.

In the "Guidelines for the Development of the National Economy of the USSR for 1976-1980", adopted by the 25th Congress, a broad programme of measures for the protection of nature and the introduction of harmony into utilisation of nature was specified. Among the measures envisaged were the following:

- To monitor the state of the environment and the sources of its pollution by means of up-to-date scientific

and technological facilities.

—To drastically reduce the harmful effects of waste products on the environment. To take more vigorous steps to devise and apply technological processes which reduce the amount of waste and ensure its maximum utilisation and closed-cycle systems of using water.

—To develop the specialised production of machinery, articles and materials necessary for the installation and operation of high-efficiency purification plants.

—To devise new ways and means of combating harmful discharges into the atmosphere, industrial, transport and other noise, vibration and the effects of electric and magnetic fields and radiation.

—To increase the fertility of the soil and improve its protection from the effects of water and wind erosion, resalination, aridisation, underflooding and pollution by industrial waste. To observe strict economy when allotting arable land for non-agricultural needs. To ensure recultivation of land after mining and peat-digging.

—To take steps towards a comprehensive and rationalised utilisation and conservation of land, water and forest resources.

—To improve the techniques of forecasting the effects of production on the environment and take into account its possible consequences in preparing and adopting project designs.

The 1976-1980 Five-Year Plan allocated the expenditure of 11,000 million rubles for purposes of protecting the environment. This is a great sum and the Soviet state intends to increase such allocations in future.*

The 25th Congress stressed the special role of agriculture as a huge and continually functioning mechanism

* *Documents and Resolutions. XXVth Congress of the Communist Party of the Soviet Union*, pp. 189-190.

for the protection and cultivation of living natural wealth. This view substantiates the important role of farm production in bringing the relations between society and nature into harmony. The point is not just to take from nature a steady tribute of harvest yields and livestock increase, but to do it in such a way as to preserve and enrich nature!

In the Report of the CPSU Central Committee to the Congress the basic principle of the relations of socialist society to the environment was formulated. "There are different ways of using nature. One can leave in one's wake barren, lifeless expanses that are inimical to man—the history of mankind knows many such examples. But ... it is possible and necessary to improve nature, to help it unfold its vital forces more fully. There is a simple expression, 'flowering region', which everybody knows. This is the name given to lands where people's knowledge, experience, attachment and love for nature have indeed worked miracles. This is our socialist way."*

This statement virtually defines the strategy of socialist utilisation of nature. Not a strategy of "survival", such as capitalist futurologists seek without success, not a strategy of conservation, but a strategy of enriching nature on the basis of the scientific, balanced and comprehensive tapping of its riches, on the basis of the co-ordinated action of the forces of society and the forces of nature, from which both man and nature will gain. And only along this path does there lie a solution of the ecological problems which are now causing the whole world such unease.

There has been a considerable increase in active measures taken by other socialist countries as well to protect the environment. Thus in May 1970 the People's Chamber in the German Democratic Republic adopted a

* Ibid., pp. 63-64.

law on the planned socialist development of the country's natural wealth, which embraces all the questions of nature protection. In Yugoslavia the Union Federal Assembly has adopted the Fundamentals of the Policy of Urbanisation and Land Usage. In 1967 a new law was passed in Bulgaria on the protection of nature which more fully conformed to the country's present conditions and possibilities. In September 1973 a law on environmental protection adopted by the National Assembly of Rumania came into force, and so on.

In the fraternal countries organisation of nature protection and the utilisation of nature continue to be improved. Thus in Poland a government organ—the Polish Committee for Environmental Protection—was established in 1970. In 1972 a Ministry of Forestry and Environmental Protection was set up, and an Institute of Environmental Protection, attached to it, has been functioning since January 1973.

In Bulgaria within the framework of the State Council there is a Council for the Protection and Reproduction of the Natural Environment, and in the National Assembly—a Commission for Environmental Protection. In 1971 a Ministry of Forests and Protection of the Natural Environment was set up on the basis of the Ministry of Forests and the Timber Industry. A great deal of work is being done by the National Committee of Nature Protection of the National Assembly of the Fatherland Front.

In Rumania a National Council for Defence of the Environment, subordinated to the Council of Ministers, as well as district commissions for environmental protection have been set up.

In Czechoslovakia in 1971 the Czech and Slovak governments set up Councils for Environmental Questions, whose duties include drafting measures relating to the protection and improvement of the environment and

the co-ordination of the activities of various ministries and bodies in implementing these measures.

In Hungary in 1973 the government drew up and approved two long-term programmes for protection of the environment over a 15-year period—covering biological and hygienic problems. This work is being directed by the Hungarian Academy of Sciences and the Ministry of Health.

The important thing is not just the decrees, laws, ministries and committees. What is important is the practical work carried out in accordance with these decrees and laws and the implementation of the directions and recommendations that are worked out. As has already been noted, many Western countries also have sufficiently advanced legislation on environmental protection and a complex structure of environmental organisations. But only the results of the operation of a particular law, or of the working of a particular committee show their true force and significance.

From this point of view the work being done in the USSR to reduce the adverse influence of industrial production of the environment is without precedent. The Soviet state does not hesitate to close down, transfer or completely wind up enterprises which spoil good living conditions for people. Thus in a short period of time in Moscow alone more than 700 enterprises and workshops were removed on ecological grounds beyond the city boundaries or reconstructed. In the USSR it is forbidden to commission new enterprises until purification installations are fully ready; the same ruling applies to reconstructed enterprises. The Soviet Union was the first country in the world to establish limits for permissible concentrations of over 140 harmful substances in the air and 487 in reservoirs as well for dozens of combinations of these substances. These standards are the most rigorous in the world.

The Soviet Union long ago brought together the supply of power and heating in towns. At the present time thermal power stations provide about 80 per cent of the electricity the towns need, whereas in capitalist countries this rational form of developing power supplies, which makes it possible to solve a whole set of tasks—to save raw materials and power, to reduce the level of pollution of the air mass and to increase living comforts—has virtually not become widespread. Research into the possibility of switching motor vehicles over to gas is being widely conducted. In the development of transport preference is being given to public transport as a matter of principle. The heat balance of the towns and the processes of utilising all forms of fuel are being improved.

Enormous attention is being paid to the comprehensive utilisation of every form of raw material or fuel. Thus Soviet scientists have evolved a progressive method of obtaining nitric acid from the fumes of nitric acid production processes. In the same way the problem was solved of capturing sulphuric anhydride, and now about 30 per cent of the sulphuric acid produced in the country is obtained from gases which were previously just thrown into the atmosphere. This acid is of higher quality and 30 per cent cheaper to produce. The economic gain of such a method amounts to about 25 million rubles a year. I think the ecological gain is no less.

Broad investigations in the field of the recycling of water are under way. Already today many enterprises, especially petrochemical and oil refineries, have systems of water recycling. In such conditions the purification installations acquire a new function—instead of simply hygienic treatment of the water they prepare it for use in the production cycle. At the present time 55.8 per cent of the water used in industry follows a closed cycle. In ferrous metallurgy there are plants which draw up to

96 per cent of their water from a closed cycle system.

Nowhere else in the world is afforestation being carried out on such a scale as in the USSR. State plantings alone cover about 1,300,000 hectares a year.

Only in the conditions of socialism was it possible to find the theoretical basis for and to achieve the practical implementation of the division of the country into economic regions each of them based on territorial and production complexes. From the ecological point of view the importance of these economic regions is that a single comprehensive plan for the development of its economy, distribution of population and protection of the natural environment can be drawn up taking full account of the region's specific natural features.

There can be no doubt that the industrial groupings that are being established in the socialist countries will also have a great relevance to protection of the environment. Although within the framework of such groupings it is not a simple matter to ensure observance of the necessary norms of green belts and water facilities, and although extensive recreation zones are needed here, nevertheless precisely such "group" siting of industry offers possibilities of radically solving the problem of pollution. Totally new prospects are opened up here not only for the centralised purification of effluent but also for the establishment of completely closed production cycles in which the waste products of one enterprise provide raw material for another, and an almost one hundred per cent utilisation of the raw material nature provides is achieved. There is no need to explain that such a siting of industry and also the transforming of industry from a "grouping" into a comprehensive system is possible only in the conditions of socialism.

All this goes to show that present-day technological systems and the multiplicity of these are creating a real possibility of making the thriftiest use of natural re-

sources and of protecting the environment. The technology of processing natural material is continually being improved and this enables the fullest utilisation of its useful properties. Each branch of production is increasingly becoming "autonomous" in the ecological respect. On an increasingly wide scale the waste heat from metallurgical and other high energy consuming enterprises is being used for heating and for hothouse farming. The proportion of metal, paper, timber and other used material that is returned to the production cycle is steadily increasing. Systems utilising domestic refuse have been evolved and are already functioning. All these are elements of a well-shaped future system of production without any waste, without any smoke and without any effluent. It is obviously beyond the powers of a separate enterprise or a separate branch of industry to create such a system. It can become a reality only as a result of the joint efforts of all the production enterprises of a particular region or a whole country, that is to say, it is once again a question of an extensive problem solved according to an integral plan by common efforts in the common interest, and the advantages of the socialist system are once again obvious here.

The responsible and collective approach to environmental protection which is inherent in socialism produces extremely swift results in carrying out major tasks of an economic plan. Thus, for instance, the decree "On measures to avert the pollution of the Volga and Ural river basins with unpurified effluent" was not only taken up for implementation by the regional authorities to whom it was directly addressed, but was also, as it were, supplemented by them. For instance, in the Yaroslavl Region specific measures were drawn up which determined the capacities and inauguration dates of water conservation installations, purification plants, and systems of water recycling, of secondary utilisation of

water and of linking up with existing urban sewage facilities, as well as of measures for completely ending the discharge of unpurified effluent into the Volga by 1980. Local organisations decided to supplement the tasks set by bringing into operation an extra 65 water conservation installations to a total value of 37 million rubles. By 1980 this region will complete 132 new purification installations, including 37 biological, 79 mechanical and 16 chemical water purification plants with a total capacity of 377,000 cubic metres. Such an approach to the problem cannot but please all who treasure the cause of environmental protection.

Yet another circumstance should be noted which from the point of view of bringing the relations between society and nature into harmony shows socialism to be unrivalled. The point is that, firstly, the measures to protect nature and rationalise the utilisation of its resources are extremely costly. Suffice it to say that the cost of purification installations sometimes amounts to one-third of the cost of the basic assets. When it is a case of protecting a river basin or a sea, it is clear that not even the biggest enterprises or even a whole branch of industry could bear such expenditures. They can be borne only by the whole country, by the whole of society. Secondly, the full economic benefit of such measures cannot be obtained just by separate enterprises, although they will undoubtedly benefit from them, nor can it be calculated and determined by the usual indices. The benefit becomes obvious only on the scale of society as a whole, being expressed in the health of the general public, in the way they feel, in their capacity for work and creative activity. The benefit is not always immediately apparent, it is seen years, decades, or generations later. An antagonistic society cannot wait. It is always a society of temporisers, and the outlook of temporising makes the capitalist strive for

immediate profit. Only a society with its eyes on the future, concerned for the future and consciously building its future can fully implement the principles of environmental policy and derive from these principles manifold benefits and not just profits. Only socialist society makes this possible.

To safeguard nature and treat it with regard for its possibilities means to receive increasing returns from it—that is how socialist society poses the question. In other words, while producing the material goods needed for the reproduction of social life, the new world strives to organise their production in such a way that nature should be able constantly to restore its strength and renew the conditions for man's existence.

All the socialist countries are taking major steps to protect the environment and improve the utilisation of nature, thus testifying to the fact that concern for the world of nature has become an important task of the whole socialist community. Thus, for instance, in the German Democratic Republic, which is a highly developed industrial country, protection of the environment is a state issue. According to the law on the planned socialist development of natural resources, measures to protect the environment have become as inseparable a part of national economic plans as any other index. Enterprises are held responsible to local government organs for their fulfilment of these plans.

The careful use of land is a vital problem for the German Democratic Republic. The soil there is utilised to a high degree: 60 per cent is under cultivation and 27 per cent is forest land, but this amounts to only 0.37 hectare per head of population. For this reason the importance of every plot of land is understandable. At the same time the country is forced to allocate considerable areas for coal mining—the German Democratic Republic produces 40 per cent of the world's lignite. It

is mined at open-cast workings which, as is well known, have the side-effect of producing "lunar" landscapes.

The German Democratic Republic has found the answer in recultivation. By 1975 the country's lignite industry had to recultivate about 10,000 hectares of land. A total of 5,627 hectares were restored from 1965 to 1973 alone.

Where the soil cannot be restored, there appear ... recreation zones. For instance, the well-known Senftenberg Lake was the result of the magical transformation of an immense quarry. The edges of the quarry were smoothed, the drainage channels were blocked and trees were planted on a waste bank, which has now become an island of 200 hectares. Then the waters of the Schwarz Elster River were diverted to the quarry and the first bathing season opened at the Senftenberg Lake on 1 June 1973. Now as many as 40,000 people visit the lake on holidays.

The "Quarry Lake" near Leipzig, the lake near the city of Zeitz and several other recreation sites arose in the same way.

Great attention is paid to reducing discharge of waste into the atmosphere. The law on environmental protection makes industrial enterprises directly responsible for not polluting the air with contaminating substances. Standards have been set for 113 such substances and violation of these standards is fraught with severe penalties. The majority of thermal power stations have dust traps which are 98-99 per cent effective. Air purification installations are being created for cement works, steel foundries and various branches of industry. A unified national control-measuring system is being set up with the task of ensuring that the legally-required standards are observed and of detecting sources of pollution.

The German Democratic Republic has found interesting solutions to the problem of utilising waste material,

controlling the quality of water, soil, and so forth. The shortage of land has not prevented the German socialist state from establishing 654 wildlife reserves covering a total area of over 80,000 hectares. Natural beauty spots have been taken under state protection and are mainly designated for recreation. Such zones occupy about 18 per cent of the total territory of the GDR.

The successful solution of environmental problems in the socialist countries is largely determined by the fact that nature protection is a matter of public interest. In the GDR, for instance, the popular front has for many years organised competitions with the appeal: "Let us make our towns and communities more beautiful! You too join in this!" Hundreds of thousands of people have responded and every year they tidy up suburban zones, city parks and gardens, plant trees and make their towns and villages smart.

It is quite logical that countries guided in their economic activities by similar principles and basing their policies on proletarian internationalism, should find it fairly easy to organise close co-operation in the field of nature protection and the improving of the utilisation of nature.

Thus the USSR jointly with Poland is conducting research into condensing the sediment of effluent and turning it into fertiliser, and jointly with the GDR—on rendering innocuous and utilising domestic garbage. The GDR and Czechoslovakia are jointly studying problems on air purification. Czechoslovakia and Poland have concluded agreements on keeping the atmosphere clean, the GDR and Poland—on the protection of water and air basins, and so forth.

Developing bilateral co-operation in every way the member-countries of the Council for Mutual Economic Assistance (CMEA) at the same time attach special importance to multilateral co-operation and collective

efforts and quests in the sphere of environmental protection. This co-operation began in the mid-sixties when the subject of "Protection of Water and Air Basins from Pollution by Harmful Substances" was included in the collated plan for co-ordination of the most important scientific and technological research studies conducted by the CMEA member-countries. Later a single set of criteria and norms for the purity of surface waters was collectively worked out. About 100 environmental protection studies were successfully completed in the period from 1964 to 1970.

A decisive factor in the growth of co-operation between the fraternal countries in the ecological sphere was the adoption in 1971 by the Twenty-Fifth Session of CMEA of the Comprehensive Programme for the Further Extension and Improvement of Co-operation and the Development of Socialist Economic Integration of the CMEA Member-Countries. Among the basic scientific and technological items in this programme was "The working-out of measures for protection of the environment", including 39 points. In 1973 Yugoslavia joined in the work being done on this problem.

Joint efforts are producing good results. In 1973-1974 alone 37 collective studies of urgent problems of the sanitary protection of reservoirs and lakes, and of atmospheric and soil hygiene were completed. More than 60 methods of determining and analysing chemical substances polluting the air were worked out and unified. Work was completed on compiling an international scientific and technological forecast for the period up to 1990, fixing the directions of research studies in the field of environmental hygiene. New types of controlling and measuring apparatus have been devised. Recommendations have been drawn up for destroying oil waste in harbours, as well as technological requirements for the washing of tankers. The "ecological

suitability" of about 40 types of motor vehicle has been checked and a new idling economiser devised. A way of cleansing effluent of viscose plants by using calcium hydroxide has been devised. Bag-type filters with jet purging, which ensures 98.5-99.5 per cent purification of gases, have been introduced in lead and copper production. Experimental industrial installations for neutralisation of industrial effluent and the extraction of valuable components from solutions and pulp, as well as various types of apparatus for the electromagnetic treatment of water and pulp have been designed, built and tested.

A Board on the Protection and Improvement of the Environment was set up in 1973 within the framework of the CMEA Committee for Scientific and Technical Co-operation. This was virtually the creation of a working body to co-ordinate the practical scientific collective activities of the fraternal countries in studying and organising environmental protection.

At the present time all the work of the above committee is being conducted on the basis of a programme approved by the CMEA Executive Committee, the "General expanded programme of co-operation of the CMEA member-countries and Yugoslavia for the period up to 1980 in the field of protection and improvement of the environment and the related rational utilisation of natural resources". The eleven major problems covered by the programme include virtually all aspects of environmental protection. On many items studies are being conducted which envisage the creation of new or the improvement of existing technological processes with due account for ecological requirements. In particular, it is intended to create six technological processes where there is no waste product: the baking and smelting of non-ferrous metal scrap without gas discharge; the effluent-free sorting of fibrous semi-finished products of the pulp and paper industry; bacterial and other

methods of leaching certain metals, and so forth.

But the socialist countries are co-operating in solving questions of environmental protection not only with each other. In the Final Act of the Conference on Security and Co-operation in Europe the conference participants expressed their agreement that the protection and improvement of the environment, as well as the protection of nature and rational utilisation of its resources in the interests of present and future generations, are one of the tasks of major importance to the well-being of the peoples and the economic development of all countries and that many environmental problems can be solved effectively only through close international co-operation. The socialist countries and, in particular, the Soviet Union, have always held such a standpoint, as is evinced by the whole of their international practice in the matter of the protection of nature.

Precisely the USSR was the initiator of the ban on nuclear tests in the three spheres. The signing of an agreement on this question was a truly invaluable contribution to saving the biosphere from radioactive contamination. It was precisely the Soviet Union that tabled at the Twenty-Fourth Session of the United Nations General Assembly a proposal on "The prohibition of action to influence the environment and climate for military and other purposes incompatible with the maintenance of international security, human wellbeing and health." It is precisely the USSR that is purposefully and actively striving for an end to the arms race and together with the fraternal countries putting forward proposals for rejection of the use of nuclear weapons, for a total ban on nuclear tests and for barring the emergence of new types and systems of means of mass destruction.

Today the Soviet Union has agreements on joint action ~~to~~ protect the environment with dozens of capi-

talist states. It is actively participating in the work of the world wildlife fund and other international organisations of this kind, and it is making a great contribution to implementing the international biological programme. Considerable achievements have been made in the work of the joint Soviet-American commission set up in accordance with the agreement on environmental protection between the USSR and the United States, signed in Moscow in May 1972. The Soviet Union is co-operating fruitfully in the field of environmental protection with France, Sweden, Canada, Japan, Finland, Norway, Iraq and other states. Ecology thus appears as a new platform for the development of international relations.

Today it has become perfectly obvious that the protection and improvement of the environment at the present level of science and technology is one of the most expensive programmes which man has ever carried out. It can be fulfilled only by substantially cutting down military expenditures. Limiting the arms race and reducing military budgets—this is the most important reserve not only for raising people's living standards but for improving the protection of nature. The whole world passionately desires that the insistent efforts of the Soviet state, of the countries of socialism and of all the progressive forces on our planet, directed towards easing the burden of military expenditure which the nations are bearing, should be crowned with success. Nature also, it may be said, is impatiently awaiting this.

The socialist utilisation of nature does not, of course, guarantee human society from making isolated mistakes, but most of these mistakes in environmental protection are of a subjective character. They are not inherent in socialism as a social system. On the contrary, it is precisely its regard for the major importance of the problem of "nature and society", its continual improvement of the utilisation of nature and its concern for the good of

future generations and for human existence in general that are fundamentally distinctive features of socialism. Socialism is the beginning not only of new human relations but of man's new relationship to the material basis of his life, it is a beginning that finds its practical realisation in the form of the planned and comprehensive utilisation of nature by the whole of society and in the interests of the whole of society. One may with full confidence conclude that precisely to socialism there falls the historic role of leading the world of man step by step towards bringing his relations with the world of nature into harmony. Socialism has successfully started on this path and is continuing along it with ever increasing speed, setting the whole of mankind a persuasive example by its practical deeds.

*In the dooryard fronting an old farm-house near the
white-wash'd palings,
Stands the lilac-bush tall-growing with heart-shaped
leaves of rich green,
With many a pointed blossom rising delicate,
with the perfume strong I love,
With every leaf a miracle...**

* Walt Whitman, *Leaves of Grass*, pp. 260-61.

CONCLUSION

The centuries, like huge birds, pass over this planet of ours. They leave man a complex heritage, a heritage which it is impossible to grasp and master fully.

But along with human memory there lives another memory, a dispassionate and silent one. What is once inscribed upon it is never lost. It is the memory of Earth itself.

For the Earth simply cannot forget man's accomplishments—they are all imprinted upon its face. The centuries are able to smooth this imprint and to overshadow it with new phenomena, but even time is powerless to erase it fully. The world of man writes its history not just on paper. Above all it writes its history on the face of nature.

With the awkward hand of a pupil who has just mastered writing *Homo sapiens* has left inscriptions on the tablets of our planet. It was hard work. His inexperienced hand has left deep, uneven and broken lines. His eyes and his mind were riveted to his hand's movement. The world existing around him was unexplored and therefore a scaring, hostile world.

Many centuries passed over the Earth before man was able to turn his gaze away from his hand. And only then did he see the proximity and distantness of the stars, hear the thoughtful whispering of the trees, appreciate the marvellous strength of the fertile earth and become aware of the boundlessness of existence and of the fleetingness of time. Only then did the world surrounding him, the defenceless and clear world, draw closer to him, and the face of his native planet, tormented by his own hand, was revealed to man.

Reading his old writings, man undertook to heal the Earth. Tirelessly he closes its wounds, inserts stitches, removes scabs. He helps the Earth to regain its youth, smooths its wrinkles and brings beauty to its disfigured fields and hills.

And although he is still not always successful in this task, although while healing the planet here he often wounds it there, although his right hand is sometimes unaware of what his left hand is doing, the great work has begun. And it is not hard to divine the splendid part this work is destined to play in the history of the world of man.

The innate unity of nature which is ever more profoundly revealed to man only serves to emphasise how unnatural is the disunion of mankind. The man-made deserts and stone jungles might seem to refute the notion that either passion for conquest or feeble submission can be rooted out. The fragility of the planet teaches caution in managing the forces of nature. A glance at the heritage of past eras compels a critical reassessment both of past as well as present aims and gains. The world of man, having heard the anguish of the world of nature, will no longer ever again be the same as it has hitherto been.

Yes, the centuries bring us a varied heritage. But this plain fact makes us pause to consider well what gift the centuries shall bear to the future from us and our time.

Man always thinks he is living at a turning point in

time, at a period of particular importance. But without fear of error our time can truly be called a turning point. It is in our century that man has for the first time mastered the secret of stellar matter and has gained mighty power comparable with the forces of nature. Today, one may say, man literally holds the future in his hands: one false move and it may be the end of the existence of mankind and of our planet. It is in our century that man for the first time passed beyond the bounds of the Earth, first saw for himself with his own eyes how relatively small it is and how boundless is space, and in all fullness became aware of his own bonds with the biosphere which gave birth to him and reared him. Lastly, it was precisely in the twentieth century that man for the first time, in Engels' words, mastered the secret of his own association in society, began radically to reorganise his social world and first set about consciously creating the future. For this reason precisely our own times more than any other previous age are determining the destiny of the future.

Time will, of course, enable our mighty and farsighted descendants to make their own evaluation of the twentieth century. Our descendants may probably not agree with us on many points. On many points they may perhaps fail to understand us. But our striving to be rid of the habit, still so deeply ingrained in a large portion of mankind, of settling arguments and proving one's superiority by the use of force, our striving to be rid of the thirst for riches, of the oppression of man by man, to be rid of mistrust, suspicion and fear, our struggle for the prospering of the world of man—this our descendants shall not fail to appreciate. Just as they shall not fail to appreciate the first expressions, no matter how imperfectly manifested, of the concern of the new society to safeguard the world of nature and to ensure that the natural basis of human life and its accomplishments should be passed on to them in the fairest possible condition.

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